AMERICAN MUSEUM

BROOKLYN BOTANIC GARDEN RECORD

VOL. XVIII JANUARY, 1929 NO. 1

# DELECTUS SEMINUM
# BROOKLYN
# 1928

FOR THE ADVANCEMENT OF BOTANY
AND THE SERVICE OF THE CITY
MCMX

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* Resigned, November 1, 1928.
† Resigned, September 30, 1928.

# BROOKLYN
# BOTANIC GARDEN
# RECORD

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## DELECTUS SEMINUM, BROOKLYN 1928

### LIST OF SEEDS OFFERED IN EXCHANGE

These seeds, collected during 1928, are offered to botanic gardens and to other regular correspondents; also, in limited quantities, to members of the Brooklyn Botanic Garden.

We offer this year seeds chiefly of herbaceous plants.

### PTERIDOPHYTA

**Marattiaceae**

Angiopteris
    evecta

**Osmundaceae**

Osmunda
    Claytoniana
    regalis
Todea
    barbara

**Polypodiaceae**

Adiantum
    cuneatum
    cuneatum var. Croweanum
    hispidulum
    trapeziforme
Aglaomorpha
    Meyeniana
Asplenium
    nidus
    platyneuron
Blechnum
    occidentale
Davallia
    pentaphylla
Diplazium
    lanceum
    zeylanicum
Doodia
    blechnoides
Drynaria
    quercifolia
Dryopteris
    erythrosora
    marginalis
    opaca
    Sieboldii

- Microlepia
  - majuscula
- Nephrolepis
  - acuminata
  - cordifolia
  - rivularis
- Oleandra
  - articulata
- Pellaea
  - viridis
- Phegopteris
  - Dryopteris
- Polypodium
  - aureum
  - aureum var. areolatum
  - aureum var. cristatum
  - punctatum
  - subauriculatum
  - vulgare
- Polystichum
  - acrostichoides
  - capense
- Pteris
  - cretica var. Wimsettii
- Tectaria
  - cicutaria

### Schizaeaceae

- Aneimia
  - phyllitidis

### Selaginellaceae

- Selaginella
  - Emmeliana
  - Emmeliana var. aurea
  - Wildenovii

## DICOTYLEDONES

### Acanthaceae 266

- Acanthus
  - longifolius
  - mollis

### Aizoaceae 84

- Mollugo
  - verticillata
- Tetragonia
  - expansa

### Amarantaceae 79

- Amarantus
  - blitoides
  - retroflexus
- Celosia
  - argentea
  - cristata
  - cristata (yellow)
  - plumosa
  - plumosa (yellow)
- Gomphrena
  - globosa
- Telanthera
  - polygonoides

### Apocynaceae 247

- Amsonia
  - Tabernaemontana
- Rhazya
  - orientalis

### Araliaceae 227

- Aralia
  - hispida
  - racemosa

### Asclepiadaceae 248

- Asclepias
  - syriaca
- Ceropegia
  - Woodii (tubers)
- Cynanchum
  - nigrum
  - Vincetoxicum

### Balsaminaceae 168

- Impatiens
  - Balsamina
  - biflora
  - pallida

### Berberidaceae 93

Caulophyllum
    thalictroides

### Borraginaceae 252

Anchusa
    officinalis
Caccinia
    strigosa
Echium
    vulgare
Lindelophia
    longiflora
Myosotis
    scorpioides
Onosma
    echioides
Oreocarya
    affinis
Symphytum
    officinale

### Campanulaceae 276

Campanula
    alliariaefolia
    bononiensis
    carpatica
    carpatica var. alba
    glomerata
    latifolia
    latifolia var. alba
    latifolia var. eriocarpa
    mirabilis
    Morettiana
    punctata
    rapunculoides
    rotundifolia
    versicolor
Platycodon
    grandiflorum
    Mariesii
Trachelium
    caeruleum
Wahlenbergia
    dalmatica

### Campanulaceae —*Lobelioideae 276a*

Lobelia
    cardinalis
    Erinus
    syphilitica

### Capparidaceae 107

Cleome
    spinosa
    spinosa (white form)
Polanisia
    trachysperma

### Caprifoliaceae 271

Sambucus
    Ebulus
Triosteum
    perfoliatum

### Caryophyllaceae 87

Arenaria
    Saxifraga
Dianthus
    alpinus
    arvernensis
    caesius
    carthusianorum
    deltoides
    neglectus
    plumarius
    Seguieri
    squarrosus
Lychnis
    alba
    chalcedonica
    Coronaria
    Flos-Jovis
    Githago
    Viscaria var. splendens
Sagina
    procumbens
Saponaria
    caespitosa
    ocymoides
    ocymoides var. versicolor

  - officinalis
  - Vaccaria
- Silene
  - alpestris
  - ciliata
  - japonica
  - latifolia
  - maritima
  - Zawadskii
- Spergula
  - sativa
- Spergularia
  - rubra
- Tunica
  - Saxifraga

### Compositae 280

- Achillea
  - abrotanoides
  - alpina
  - aurea
  - filipendulina
  - Ptarmica
  - tomentosa
- Actinomeris
  - alternifolia
- Ageratum
  - conyzoides
- Anacyclus
  - clavatus
- Antennaria
  - neodioica
- Anthemis
  - santolinoides
- Arnica
  - longifolia
- Artemisia
  - Mutellina
  - Purshiana
- Aster
  - alpinus
  - alpinus var. speciosus
  - cordifolius
  - diplostephioides
  - Patersoni
  - subcoeruleus
- Buphthalmum
  - speciosum
- Centaurea
  - dealbata
  - montana
  - Scabiosa
- Chrysanthemum
  - cinerariaefolium
  - indicum
  - Parthenium
- Coreopsis
  - grandiflora
  - lanceolata
  - palmata
  - verticillata
- Echinops
  - exaltatus
- Erigeron
  - speciosus
- Eriophyllum
  - caespitosum
- Eupatorium
  - cannabinum
  - purpureum
  - Purpusii
- Gaillardia
  - aristata
- Gymnolomia
  - multiflora
- Helianthus
  - annuus
  - mollis
- Heliopsis
  - helianthoides var. Pitcheriana
- Inula
  - grandiflora
  - squarrosa
- Leontopodium
  - alpinum
- Matricaria
  - inodora
- Rudbeckia
  - laciniata
  - maxima
  - speciosa

- subtomentosa
- Senecio
  - Biebersteinii
  - Clivorum
  - macrophyllus
  - Petasitis
  - suaveolens
- Silphium
  - perfoliatum
- Solidago
  - altissima
  - Cutleri (S. Virgaurea var. alpina)
  - missouriensis
- Stokesia
  - laevis
- Vernonia
  - altissima
- Vittadenia
  - australis

### **Compositae**

*—Cichorieae 280a*

- Crepis
  - grandiflora
  - rubra
- Hieracium
  - aurantiacum
  - Bocconei
  - longifolium
  - rigidum
  - speciosum
- Picridium
  - tingitanum
- Rodigia
  - commutata

### **Crassulaceae 115**

- Cotyledon
  - gibbiflora var. metallica
  - platyphylla
- Dudleya
  - Stauntoni
- Echeveria
  - Whitei
- Sedum
  - acre
  - Aizoon
  - Fabaria
  - Nevii
  - sarmentosum

### **Cruciferae 105**

- Aethionema
  - coridifolium
- Alyssum
  - montanum
  - saxatile
  - saxatile var. compactum
- Arabis
  - procurrens
- Berteroa
  - incana
- Bunias
  - orientalis
- Erysimum
  - asperum
- Goldbachia
  - laevigata
- Iberis
  - amara
  - saxatilis
  - sempervirens
- Raphanus
  - sativus
- Succowia
  - balearica

### **Datiscaceae 207**

- Datisca
  - cannabina

### **Dipsacaceae 274**

- Cephalaria
  - ambrosioides
  - Graeca
- Dipsacus
  - laciniatus
- Scabiosa
  - amoena
  - caucasica

### Euphorbiaceae 147

- Euphorbia
  - Gerardiana
  - maculata
  - marginata
  - myrsinites

### Gentianaceae 246

- Gentiana
  - Freyniana

### Geraniaceae 129

- Geranium
  - albiflorum
  - grandiflorum
  - Grevilleanum
  - ibericum
  - maculatum
  - phaeum
  - pratense
  - pratense var. album
  - sylvaticum

### Illecebraceae 86a

- Corrigiola
  - littoralis
- Herniaria
  - glabra
- Scleranthus
  - annuus

### Labiatae 254

- Agastache
  - nepetoides
- Hyssopus
  - officinalis
- Lamium
  - album
  - maculatum
- Marrubium
  - Kotschyi
  - vulgare
- Micromeria
  - croatica
- Monarda
  - citriodora
  - mollis
- Nepeta
  - macrantha
- Phlomis
  - alpina
  - tuberosa
- Prunella
  - vulgaris
- Salvia
  - acetabulosa
  - cadmica
  - cleistogama
  - hians
  - Jurisicii
  - pratensis var. Baumgartenii
  - virgata
- Scutellaria
  - baicalensis
  - peregrina
- Sideritis
  - scordioides
- Stachys
  - grandiflora
  - officinalis
  - palustris
  - sylvatica

### Leguminosae
### —*Mimosoideae 127a*

- Desmanthus
  - illinoensis

### Leguminosae
### —*Papilionatae 128*

- Astragalus
  - alopecuroides
  - Cicer
- Baptisia
  - australis
  - perfoliata
- Galega
  - officinalis
  - orientalis

Glycine
    Soja (black seeds)
    Soja (brown seeds)
    Soja (yellow seeds)
Lupinus
    polyphyllus
Medicago
    falcata
    sativa
Ononis
    arvensis
Trigonella
    foenum-graecum

### Linaceae 132

Linum
    flavum
    maritimum
    perenne
    usitatissimum

### Loasaceae 206

Blumenbachia
    Hieronymii

### Lythraceae 216

Cuphea
    lanceolata
    procumbens
Lythrum
    Salicaria
    Salicaria var. roseum
    virgatum
    virgatum " Rose Queen "
Nesaea
    triflora

### Malvaceae 175

Althaea
    rosea
Hibiscus
    militaris
    Moscheutos (white, red center)
Kitaibelia
    vitifolia

### Moraceae 64

Humulus
    japonicus

### Nyctaginaceae 80

Mirabilis
    divaricata
    divaricata (dwarf yellow)
    Jalapa

### Onagraceae 224

Circaea
    lutetiana
Epilobium
    angustifolium
Godetia
    purpurea
Oenothera
    fruticosa
    fruticosa var. major
Xylopleurum
    roseum

### Oxalidaceae 130

Oxalis
    stricta

### Papaveraceae 104

Argemone
    mexicana
Bocconia
    cordata
    microcarpa
Chelidonium
    majus
Dicranostigma
    Franchetianum
Eschscholtzia
    californica
Glaucium
    flavum
Papaver
    lateritium
    orientale
    Rhoeas
    Rhoeas " Shirley "
Sanguinaria
    canadensis

### Papaveraceae

*—Fumarioideae 104a*

- Dicentra
  - eximia

### Plumbaginaceae 238

- Acantholimon
  - glumaceum
- Armeria
  - caespitosa
  - juncea
  - vulgaris
  - vulgaris var. Laucheana
- Limonium
  - latifolium
  - speciosum
  - vulgare
- Statice
  - Wildenoviana

### Polemoniaceae 250

- Gilia
  - achilleaefolia
  - capitata

### Polygonaceae 77

- Atraphaxis
  - lanceolata
- Eriogonum
  - racemosum
  - umbellatum
- Polygonum
  - orientale
  - Sieboldii
- Rheum
  - rhaponticum

### Portulacaceae 85

- Anacampseros
  - arachnoides
- Portulaca
  - grandiflora
  - marginata
  - oleracea
- Talinum
  - patens

### Primulaceae 237

- Anagallis
  - arvensis
  - arvensis var. caerulea
  - linifolia
- Androsace
  - lactiflora
- Lysimachia
  - dubia
  - punctata
  - punctata (dwarf form)
- Primula
  - flagellicaulis
  - japonica
  - kewensis
  - pedemontana
  - verticillata
- Steironema
  - ciliatum

### Ranunculaceae 91

- Actea
  - alba
- Anemone
  - Pulsatilla
  - Pulsatilla var. alba
- Aquilegia
  - Buergeriana
  - canadensis
  - chrysantha
- Cimicifuga
  - americana
  - dahurica
- Clematis
  - integrifolia
- Delphinium
  - grandiflorum
- Nigella
  - damascena
- Ranunculus
  - constantinopolitanus
  - nemorosus
- Thalictrum
  - angustifolium
  - minus

Trollius
    laxus

**Resedaceae 108**

Reseda
    alba
    lutea
    Luteola
    Phyteuma

**Rosaceae 126**

Agrimonia
    odorata
    pilosa
Alchemilla
    splendens
    vulgaris
Dryas
    octopetala
Duchesnea
    indica
Filipendula
    palmata
    purpurea
    Ulmaria
Fragaria
    vesca var. alba
    virginiana
Geum
    urbanum
Gillenia
    trifoliata
Potentilla
    argentea var. Calabra
    chrysantha
    Hopwoodiana
    nepalensis
    Nuttallii
    rupestris
Poterium
    obtusum

**Rubiaceae 270**

Asperula
    cynanchica
    tinctoria
Diodia
    dasycephala
Sherardia
    arvensis
Spermacoce
    tenuior

**Rutaceae 137**

Dictamnus
    albus
    albus var. ruber

**Saxifragaceae 117**

Astilbe
    grandis
    " Salland "
Heuchera
    hispida
Saxifraga
    Aizoon
    Cotyledon
    crustata
    Hostii
    irrigua
    Macnabiana
Tellima
    grandiflora

**Scrophulariaceae 257**

Antirrhinum
    maurandioides
Calceolaria
    scabiosaefolia
Digitalis
    ambigua
    lutea
    viridiflora
Hebenstretia
    dentata
Pentstemon
    glaber
Scrophularia
    marilandica
    sambucifolia
Synthyris
    plantaginea

VerbasCum
  Blattaria
Veronica
  austriaca
  Teucrium
  Teucrium var. prostrata
  Waldsteinii

### Solanaceae 256

Atropa
  Belladonna
  Belladonna (yellow fruit)
Nicotiana
  alata grandiflora (affinis)
  rustica
  Tabacum
Solanum
  sisymbrifolium

### Umbelliferae 228

Carum
  Carvi
Eryngium
  coeruleum
  Oliverianum
  planum
Heracleum
  lanatum
Levisticum
  officinale
Myrrhis
  odorata
Oenanthe
  pimpinelloides
Pimpinella
  Gouani

### Valerianaceae 273

Centranthus
  macrosiphon
Valeriana
  alliariaefolia
  officinalis
Valerianella
  coronata

### Verbenaceae 253

Verbena
  erinoides
  venosa

### Violaceae 198

Viola
  tricolor

## MONOCOTYLEDONES

### Amaryllidaceae 340

Agave
  virginica
Alstroemeria
  aurantiaca

### Araceae 323

Aglaonema
  commutatum
Arisaema
  triphyllum
Calla
  palustris

### Bromeliaceae 332

Caraguata
  Peacockii
Dyckia
  brevifolia
  rariflora
Pitcairnia
  xanthocalyx
Tillandsia
  Balbisiana
  flexuosa

### Commelinaceae 333

Palisota
  Barteri
Tinantia
  fujax
Tradescantia
  montana
  virginiana

### Cyperaceae 320

Carex
  Grayii
  punctata
  vesicaria
Kyllinga
  triceps

### Gramineae 319

Dactylis
  glomerata
Festuca
  elatior
Glyceria
  fluitans
Phalaris
  arundinacea var. picta
Secale
  cereale

### Juncaceae 336

Juncus
  conglomeratus

### Liliaceae 338

Allium
  fistulosum
  ostrowskianum
  Porrum
  Schoenoprasum var. Sibiricum
Asparagus
  officinalis
Clintonia
  borealis
Gasteria
  acinacifolia
  carinata
  nigricans
Hosta
  Fortunei
  Sieboldiana
Lilium
  dalmaticum
Muscari
  comosum
  racemosum
Polygonatum
  biflorum
  multiflorum
Scilla
  sibirica
Smilacina
  racemosa
Smilax
  herbacea
Tulipa
  australis
  dasystemon
  Marjoletti
  Sprengerii
  sylvestris
  "Avis Kennicott" (Cottage)
  "Diana" (Single Early)
  "Golden Queen" (Single Early)
  "Primrose Queen" (Single Early)
Veratrum
  viride
Yucca
  filamentosa

### Zingiberaceae 346

Brachychilus
  Horsfieldi

## SEEDS COLLECTED IN NORTHEASTERN NEBRASKA

BY MR. J. B. WERNECKE

Actaea
  alba
Agastache
  nepetoides
Agoseris
  cuspidata
Allium
  Nuttallii

- Amorpha
  - canescens
- Anemone
  - caroliniana
- Asclepias
  - incarnata
  - syriaca
- Brauneria
  - angustifolia
- Cassia
  - Chamaecrista
- Chrysopsis
  - villosa
- Ellisia
  - Nyctelea
- Epilobium
  - adenocaulon
- Gaura
  - coccinea
- Gilia
  - linearis
- Glycyrrhiza
  - lepidota
- Hedeoma
  - hispida
- Helianthus
  - annuus
- Heuchera
  - hispida
  - petiolaris
- Ipomoea
  - leptophylla
- Kuhnia
  - eupatorioides
- Lathyrus
  - ornatus
- Lesquerella
  - argentea
- Liatris
  - punctata
- Linum
  - rigidum
- Lomatium
  - orientale
- Mimulus
  - glabratus
- Nepeta
  - Cataria
- Oenothera
  - serrulata
- Onosmodium
  - occidentale
- Oxytropis
  - Lamberti
- Paliurus
  - aculeatus
- Parietaria
  - pennsylvanica
- Pentstemon
  - albidus
  - gracilis
  - grandiflorus
- Polanisia
  - trachysperma
- Polygonum
  - scandens
- Psoralea
  - esculenta
- Rhus
  - coriaria
- Rumex
  - crispus
- Smilacina
  - stellata
- Solanum
  - rostratum
- Solidago
  - rigida
- Townsendia
  - exscapa
- Tribulus
  - terrestris
- Verbena
  - hastata
  - rigida

## Seeds Collected in Utah

by Ben Johnson

- Aconitum
  - columbianum
- Allium
  - acuminatum
- Aquilegia
  - flavescens
- Astragalus
  - cibarus
  - utahensis
- Balsamorhiza
  - hirsuta
  - sagittata
- Dodecatheon
  - salinum
- Erythronium
  - grandiflorum var. parviflorum
- Fritillaria
  - pudica
- Hedysarum
  - pabulare
- Heuchera
  - rubescens
- Linum
  - Lewisii
- Oenothera
  - pallida
- Pentstemon
  - Eatonii
  - Moffattii
  - platyphyllus
  - procerus
  - secundiflorus
  - Torreyi
- Polemonium
  - foliosissimum
- Rudbeckia
  - occidentalis
- Sphaeralcea
  - rivularis
- Thalictrum
  - Fendleri

## Seeds Collected in Arizona and Southern California

by Dr. C. S. Gager

- Acacia
  - catechu
- Agave
  - consociata
- Argemone
  - platyceras
- Asclepias sp.
- Arctostaphylos
  - glauca
  - Manzanita
- Calliandra
  - humilis
- Castilleia
  - Wootoni?
- Ceanothus
  - divaricatus
- Cucurbita
  - foetidissima
- Conopholis
  - mexicana
- Dasylirion
  - Wheeleri
- Datura sp.
- Delphinium
  - Scopulorum
- Eriogonum sp.
- Eucalyptus
  - viminalis
- Geranium
  - Richardsoni
- Gilia
  - aggregata
- Leptodactylon
  - californicum
- Mentzelia
  - multiflora

- Nicotiana
  - glauca
- Opuntia
  - sp. Alt. 5500 ft.
- Parkinsonia
  - microphylla
- Pentstemon
  - barbatus
- Portulaca
  - lanceolata
- Prunus
  - ilicifolia
- Rhus
  - trilobata
  - laurina
- Rosa
  - Sayi
- Salvia
  - apiana
  - mellifera
- Simmondsia
  - californica
- Smilacina
  - amplexicaulis
- Solanum
  - Douglasii
- Symphoricarpos
  - albus
- Thalictrum
  - Wrightii
- Tradescantia sp.
- Viola
  - canadensis
- Vitis
  - arizonica
- Yucca
  - baccata
  - Whipplei

## Seeds Collected in Oregon

by Mrs. N. P. Gale

- Allium
  - cernuum
- Anemone
  - occidentalis
- Camassia
  - esculenta
- Eriogonum
  - compositum
  - orthocaulon
  - pyrolaefolium
- Erythronium
  - montanum
  - parviflorum
  - revolutum
- Fritillaria
  - lanceolata
- Gentiana
  - sceptrum
- Leptotaenia
  - purpurea
- Lilium
  - columbianum
  - washingtonianum
- Mimulus
  - Lewisii
- Parrya
  - Menziesii
- Pentstemon
  - azureus
  - deustus
  - diffusus
  - glaber
  - glaucus
  - Menziesii
  - ovatus
  - pulchellus
  - speciosus
- Phyllodoce
  - empetriformis
- Rhododendron
  - californicum

Applications for seeds should be received not later than February 28, 1929, by
SEED EXCHANGE,
Brooklyn Botanic Garden,
1000 Washington Ave.,
Brooklyn, N. Y.,
U. S. A.

## INTERNATIONAL SEED EXCHANGE

During the past year we received 128 seed lists, arranged as follows:

### 42, with Genera Alphabetical

*Genera all alphabetical:* Algiers, Belgrade, Bern, Bordeaux, Bremen, Caen, Cape Town, Dresden, Dublin (Trinity College), Edinburgh, Genoa, Giza, Glasgow, Geneva, Hatzendorf, Innsbruck, Kew, Krakau, La Mortola, Lausanne, Linz, Michigan State College, Nogent-sur-Vernisson, Parma, Prague (German), Prague (Czech.), Proskau, Pruhonice, Rastoff, Roudnice, Royal Hort. Soc., Siena, Tabor, Talence, Taschkent, Univ. of Michigan, Utrecht, Vancouver, Vienna, Zagreb.

* *Genera alphabetical under larger groups:* Darmstadt, Llow, Münden.

### 54, with Families Alphabetical

*Families alphabetical under larger groups:* Baarn, Basel, Bonn, Breslau, Brno, Budapest, Buenos Aires, Cassel, Cernauti, Cluj, Coimbra, Copenhagen, Delft, Echo (Manchuria), Erlangen, Frankfurt, Giessen, Gothenburg, Groningen, Hamburg, Heidelberg, Jalta, Kaunas, Kief, Kiel, Konigsberg, Leningrad, Leopol, Leyden, Lisbon, Lund, Lyon, Marburg, Marseilles, Modena, Morton Arb., Montevideo, Munich, Nikita, Oslo, Ottawa, Palermo, Paris, Pisa, Riga, Rome, Sofia (Agr. Coll.), Sofia (Univ.), Sapporo, Stockholm, Tiflis, Trieste, Tubingen, Turin, Upsala, Wageningen.

* *Families all alphabetical:* Nantes.

### 27, with Families Systematically Arranged

*Engler system:* Berlin, Brno, Buitenzorg, Cambridge (Engl.; Dicotyledons before Monocotyledons), Göttingen, Harvard, Metz, North Dakota Seed Laboratory (without families), Padua, Pavia, Toulouse, Tokyo, Valencia, Vilna, Warsaw, Zurich.

* *Bentham and Hooker system:* Bangalore, Bucharest, Chelsea, Dublin, Oxford.

* *Other systems:* Antwerp, Amsterdam, Dijon, Liège, Nancy, Montpellier, Rouen.

Arrangement not noted: Odessa.

The Brooklyn Botanic Garden is preparing a list of genera for submission to the now existing International Committee of Nomenclature. We intend to include present usage or preferences, especially as to families and the frequently used genera, so far as the information is available, of eleven botanic gardens and such others as they may designate. These gardens are Berlin, Kew, Paris, Zurich, Copenhagen, Geneva, Vienna, Tokyo, Arnold Arboretum, Leningrad, and Stockholm.

* Might not the gardens in the starred groups consider a change in the direction of arrangements more generally used?

# The Brooklyn Institute of Arts and Sciences

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## GENERAL INFORMATION

MEMBERSHIP.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, Brooklyn, N. Y.* Telephone, 6173 Prospect.

THE BOTANIC GARDEN is open free to the public daily from 8 a.m. until dark; on Sundays and Holidays open at 10 a.m.

ENTRANCES.—On Flatbush Avenue, near Empire Boulevard (Malbone Street), and near Mt. Prospect Reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Montgomery Street.

TO ASSIST MEMBERS and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one week in advance. No parties of less than six adults will be conducted.

TO REACH THE GARDEN take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, and Tompkins Avenue trolleys to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street and Vanderbilt Avenue trolleys to Prospect Park Plaza and Union Street.

# PUBLICATIONS

## OF THE

# BROOKLYN BOTANIC GARDEN

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly beginning with 1929. Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, announcements of courses of instruction, seed list, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others one dollar a year; 25 cents a copy. Circulates in 41 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Circulates in 47 countries.

Volume I. *Dedication Papers;* comprising 33 scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. 521 pages. Price $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. Price $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor, June 10, 1927. 151 pages. Price $1.60.

CONTRIBUTIONS. Established, April 1, 1911. Papers originally published in periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume. Circulates in 34 countries.

*52. Inheritance studies in Pisum. VI. Multiple allelomorphism and the inheritance of green and yellow foliage and pod color.* 16 pages. 1927.

*53. Mutation, adaptation to temperature differences, and geographical distribution in plants.* 12 pages. 1928.

*54. The vegetation of the Allegany State Park.* 121 pages. 1928.

*55. Physiologic races of bunt of wheat.* 14 pages. 1928.

*56. The inheritance of resistance of oat hybrids to loose and covered smut.* 48 pages. 1928.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

SEED LIST. (*Delectus Seminum*) Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 143 botanic gardens and institutions located in 42 countries.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in coöperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription, $7.00 a year. Circulates in 48 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $4.00 a year. Circulates in 48 countries.

GENETICS. Established, Janua[illegible]16. Bimonthly. Subscription, $6.00 a year. Circulates in 37 countries.

# EIGHTEENTH ANNUAL REPORT

OF THE

# BROOKLYN BOTANIC GARDEN

1928

"*The best thing in the world is wisdom,*
*and, in default of wisdom, science.*"
—AMIEL

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BROOKLYN BOTANIC GARDEN RECORD

Vol. XVIII MARCH, 1929 No. 2

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BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
BROOKLYN, N. Y.
Entered as second-class matter in the postoffice at Lancaster, Pa., under act of August 24, 1912.

# BROOKLYN BOTANIC GARDEN

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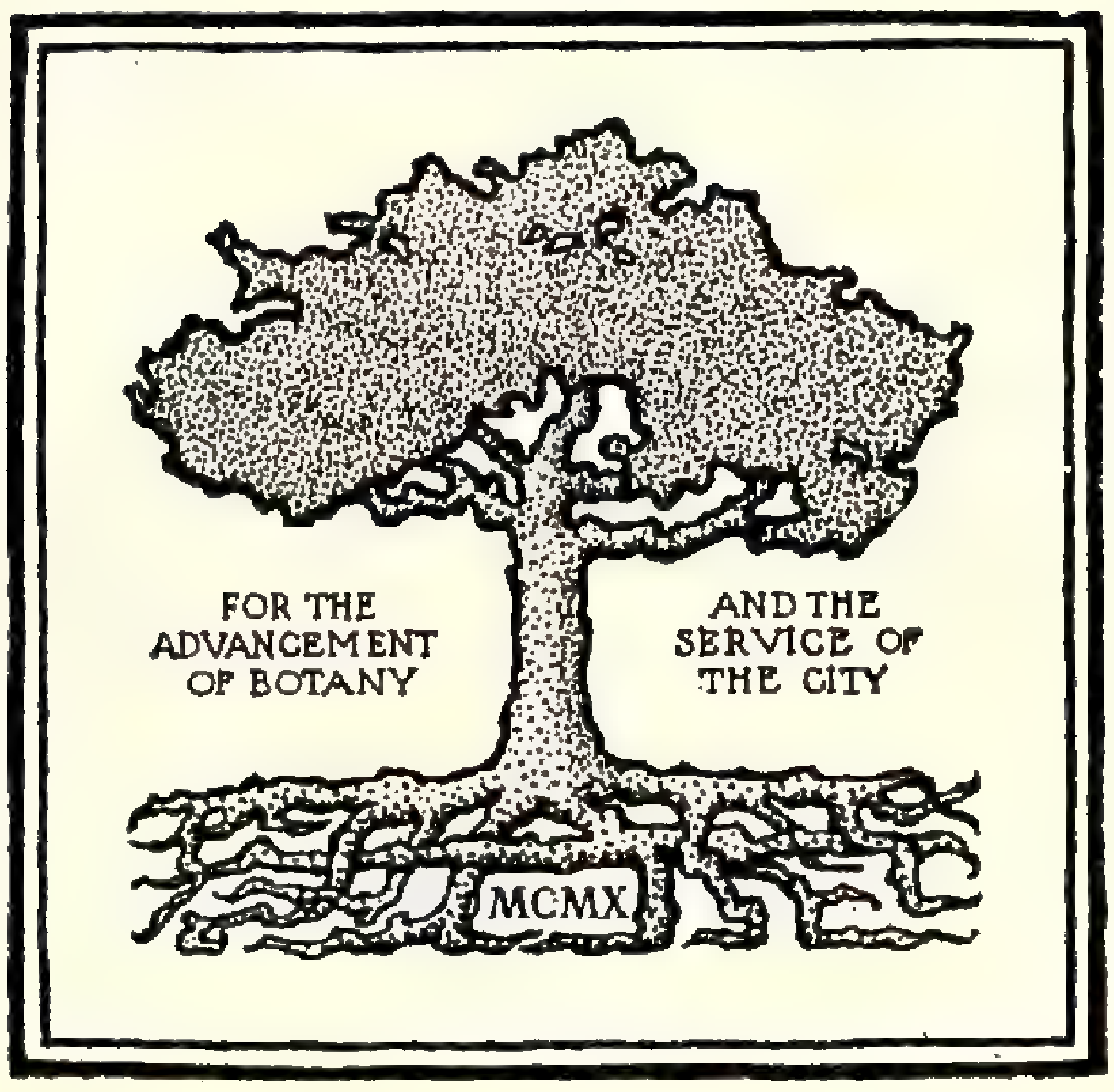
* October 1, 1928 to March 1, 1929.

# EIGHTEENTH ANNUAL REPORT

OF THE

# BROOKLYN BOTANIC GARDEN

1928



"For the advancement of botanical science and knowledge, and the prosecution of original researches therein and in kindred subjects."—*Laws of New York, 1897, Chapter 509. An Act providing for the establishment of a Botanic Garden in the city of Brooklyn.*

BROOKLYN, N. Y.
MARCH, 1929

LANCASTER PRESS, INC.
LANCASTER, PA.

# BROOKLYN BOTANIC GARDEN

## SUMMARY FOR 1928

### For the Public

1. Over 1,100,00 registered attendance, an increase of 90,000 over 1927.

2. Bureau of information served a wide range of governmental, civic, educational, scientific, and commercial institutions, in this and other countries.

3. Maintained a free reference library, with current issues of over 900 periodicals on file dealing with all aspects of plant life.

4. Continued the development of one of the most beautiful and most instructive park areas in Greater New York.

5. Installed 29 public exhibits which were viewed by 90,000 visitors.

### For the Schools

6. Supplied over 3,800 teachers with living plants, plant parts, and other study material in quantity sufficient for the instruction of over 156,000 pupils.

7. Held personal conferences with over 1,000 teachers concerning problems of biology and nature-study teaching.

8. Distributed 560,000 packets of seeds to 177,000 pupils for planting in school and home gardens.

9. Supplied over 3,200 petri dishes with sterilized culture media for the study of bacteria.

10. Members of staff gave 87 addresses, lectures, and talks, with a total attendance of over 31,000.

11. Teachers brought over 54,000 pupils to the Garden for instruction in the plantations, conservatories, and classrooms.

### For Education

12. .Gave over 600 lectures and talks to children and adults, with a total attendance of over 37,000.

13. Gave 37 courses of instruction to children and adults, with a total registration of over 6,000.

### For Science

14. Continued botanical research in plant pathology, genetics, forest pathology, ecology, plant physiology, and systematic botany.

15. Continued the publication of three journals devoted to research, and circulating in 48 countries.

"No greater challenge has been given to the American people since the great war than that of our scientific men in the demand for greater facilities. It is an opportunity to demonstrate again in our Government, our business, and our private citizens the recognition of a responsibility to our people and the nation greater than that involved in the production of goods or trading in the market . . . .

"The third type of pure science research that requires much more liberal support is the special institution. . . .

"I do not hesitate to express my opinion that the work which the Brooklyn Botanic Garden is now doing and projecting in the line of research . . . is of high usefulness from the standpoint of both pure and applied science."—PRESIDENT HOOVER.

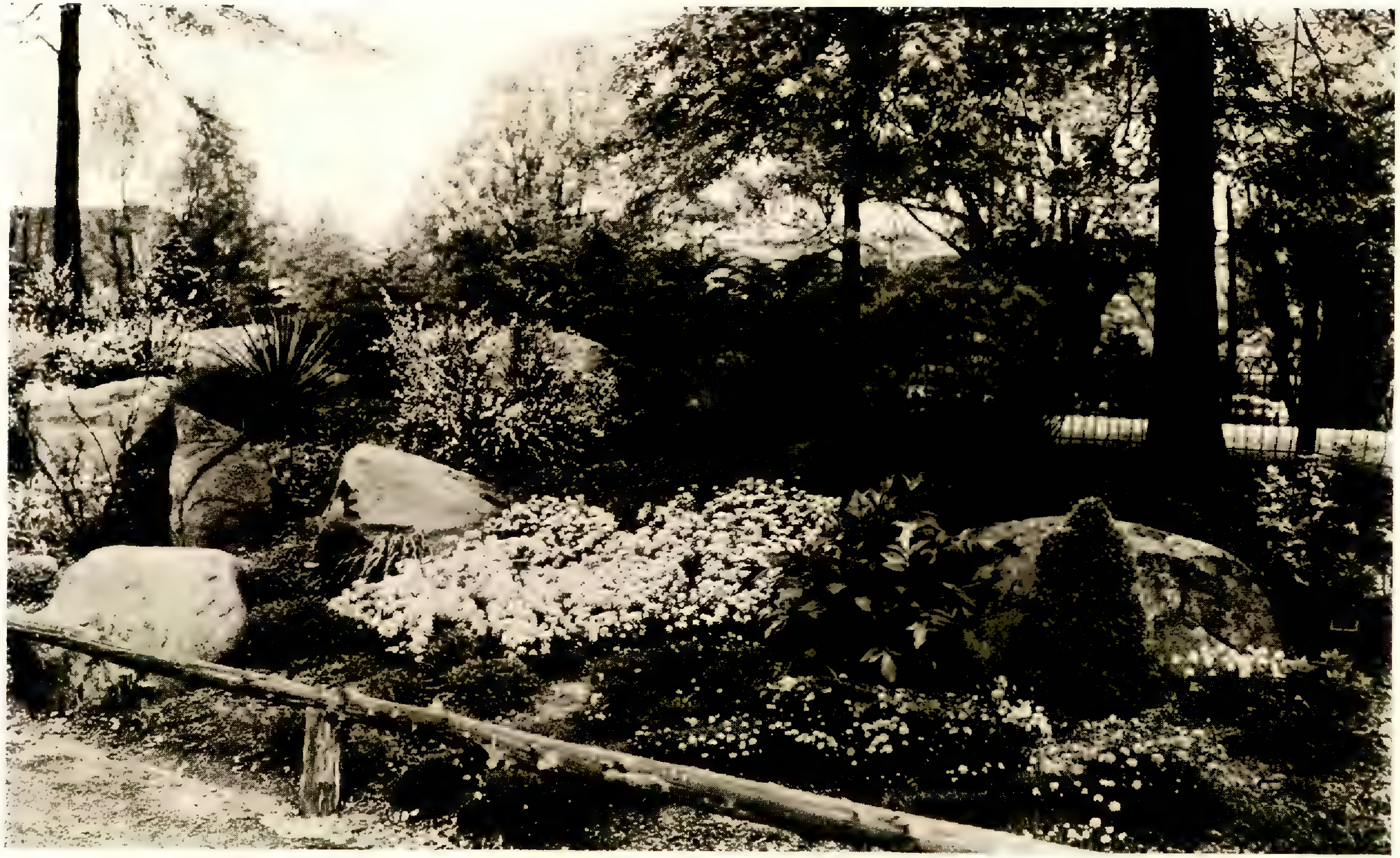


Fig. 1. Rock Garden, east side, looking northeast. Plants, from left to right: *Yucca glauca, Cytissus albus, Iberis sempervirens, Armeria vulgaris, Rudbeckia montana, Picea Albertiana.* May 18. (6495.)

# EIGHTEENTH ANNUAL REPORT

OF THE

# BROOKLYN BOTANIC GARDEN

1928[1]

## REPORT OF THE DIRECTOR

To the Botanic Garden Governing Committee:

I have the honor to present herewith the eighteenth annual report of the Brooklyn Botanic Garden, for the year 1928.

### Ecology of Botanic Gardens

The principles of botanical science are not restricted in their application to the kingdom of plants. They apply, also, to the realms of education, economics, and finance. One department of botany, for example, is Ecology. The word is akin to the more familiar term, Economy (the law of the house); it means, literally, the science of the home life (of plants or of animals). It is a fundamental principle of Ecology that an organism must correspond with its surroundings—with the various factors of its environment; otherwise it weakens or dies.

So it is with such an organism (organization) as a botanic garden; if it is to become strong it must develop in harmony with its environment, and in particular with local needs.

Perhaps the most common conception of a botanic garden is the restricted one which reads a literal meaning into the name, and regards the institution *merely* as a garden. Gardens are real needs in a civilized society, and ornamental or flower gardens no less so than vegetable gardens, for beauty is an essential element in human life. Any urban community that has no botanic garden lacks an important cultural asset, and so, merely by maintaining a garden area, a botanic garden meets an important need of its community.

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[1] Brooklyn Botanic Garden Record. Vol. XVIII, No. 2, March, 1929.

### A Botanic Garden is More than a Garden

But a botanic garden is much more than a garden; its work includes all activities that may grow out of or be correlated with gardens. We have frequently stated that the work of the Brooklyn Botanic Garden includes anything scientific or educational based upon plant life. We have not, of course, realized this ideal in its fullness but, to paraphrase Browning, an institution's reach must exceed its grasp, and nothing that comes within the broad ideal above stated is foreign to our interest nor to our active support, so far as our resources and equipment permit.

### Public Response

The Brooklyn Botanic Garden was organized in 1910 in a community of nearly two million inhabitants but without any provision whatever, outside of the public and private schools, for assisting people to a knowledge of plant life or gardening, or for stimulating or fostering the desire for such knowledge. The steady increase of attendance from not more than 10,000 a year to more than 1,100,000 a year in less than seventeen years, shows how great was the need for such opportunity, and how prompt and generous was the response.

### Practical Planning

The Garden was not planned along theoretical lines but, first of all, a survey was made of existing educational and scientific agencies to see how, if at all, their work could be supplemented or enriched. And then account was taken of needs not met at all, and the endeavor was made to organize a botanic garden to meet those needs and fill the gaps.

### School Service a Primary Aim

To enrich the teaching of nature study, botany, and geography in the public schools became a primary aim. The multifarious nature of the resulting program, and the extent of the need as indicated by the response, are shown in the table on page 19.

## TABLE I

### Statistics of School Service

| | 1928 | 1927 |
|---|---|---|
| *Conferences* | | |
| Number of Teachers | 1,060 | 670 |
| Number of Pupils involved | 49,600 | 21,580 |
| *Loan Lectures* (Lantern slides, etc.) | | |
| Number of Teachers | 69 | 26 |
| Number of Pupils attending | 6,736 | 2,174 |
| *Study Material Supplied* | | |
| Number of Schools and annexes | | |
| High | | |
| In Brooklyn (Total No. in Borough, 14, plus 17 Annexes) | 25 | 21 |
| In Queens | 8 | 6 |
| In Manhattan | 19 | 8 |
| In other Boroughs | 10 | 4 |
| Junior High Schools | 18 | 12 |
| Colleges, Universities, and Museums | 11 | 8 |
| Training Schools for Teachers | 4 | 2 |
| Elementary Schools (Total in Borough, 214) | 123 | 66 |
| Private and Parochial Schools | 25 | 22 |
| Number of Teachers | 3,818 | 2,995 |
| Number of Pupils instructed | 156,619 | 109,011 |
| *Exhibits Provided* | | |
| Number of exhibits | 29 | 9 |
| Viewed by | 89,065 | 11,200 |
| *Living Plants Placed in Schools* | | |
| Number of schools | 150 | 130 |
| Number of plants | 18,295 | 25,251 |
| *Agar (sterilized) for Class Use* | | |
| Petri dishes | 3,231 | 2,338 |
| Flasks | 34 | 10 |
| *Seed Packets for Children* | | |
| Schools | 415 | 220 |
| Teachers | 3,574 | 5,626 |
| Pupils | 177,110 | 268,519 |
| Packets | 559,754 | 705,694 |

A thorough, well organized educational program for children, as well as for adults, had never been undertaken by a botanic garden when this institution was organized. But, as a recent writer has stated, "The world holds no more tyrannous and bumptious arrogance than that of interest for adults only." Museums were beginning to recognize this at the beginning of the present century, and children's work gradually became an important part of the educational program of all the leading museums. This work found its highest development in the Children's Museum of Brooklyn (another Department of the Brooklyn Institute of Arts and Sciences), a pioneer in this line and the model of several children's museums in other cities. No opportunity for voluntary education for children ever met a more spontaneous or enthusiastic response; no money expended for education ever yielded larger returns.

## Community Service

But educational work with children was not confined by us to cooperation with the schools. Popular courses of instruction were organized in the plantations, children's greenhouses, conservatories, children's gardens, classrooms, and laboratories, with a total attendance that soon reached the significant figure of approximately 50,000 a year—practically the same as the attendance at work offered in cooperation with the schools.

## Adult Education

Increasing attention has been given during the past few years to the subject of adult education. By adult education is meant educational opportunities for persons past the average age of graduation from high school, and who can give only a small fraction of their time to continuing their schooling. Plans are being perfected for a survey of the opportunities in this line now available in Brooklyn. The Brooklyn Botanic Garden has, from the beginning, offered opportunities to adults. In fact, the plantations, conservatories, library, herbarium, and bureau of information all minister to this need, and have been developed with this in view. The response has more than justified the plans to meet it.

## World Contacts

No institution can render the most effective service to its local community if its range is merely parochial. The advantage of international contacts, in particular, is not only stimulating, but reciprocally advantageous—in science no less than in commerce and art and other human activities. Other things being equal, that institution can render the richest service to its own community which has the largest number of contacts with other communities in its own and foreign lands.

### *Circulation of Publications*

As illustrating the international aspect of our work, attention is called to the fact that our technical and popular publications circulate in 65 foreign countries. By a generous system of exchanges, supplemented by subscriptions, the current issues of over 900 periodical publications on plant life and gardening are on file in our library, which is open free to the public daily. These publications come from nearly every civilized country.

### *International Seed Exchange*

We are exchanging seeds and other living plant material for propagation and study with 140 botanical institutions located in 40 countries. By this means we are helping to disseminate native American plants in other lands, and are enriching American gardens by the introduction of foreign plants here.

### *Bureau of Information*

The Brooklyn Botanic Garden has become a clearing house for information and advice on every aspect of plant life (pure science, applied botany, conservation, etc.). Inquiries are being received and answered daily from all parts of the United States and from foreign countries.

The appended reports of various heads of departments set forth in more detail the multifarious ways in which the Garden is endeavoring to correspond with its environment—to serve the community, and to extend its influence throughout the scientific and educational world.

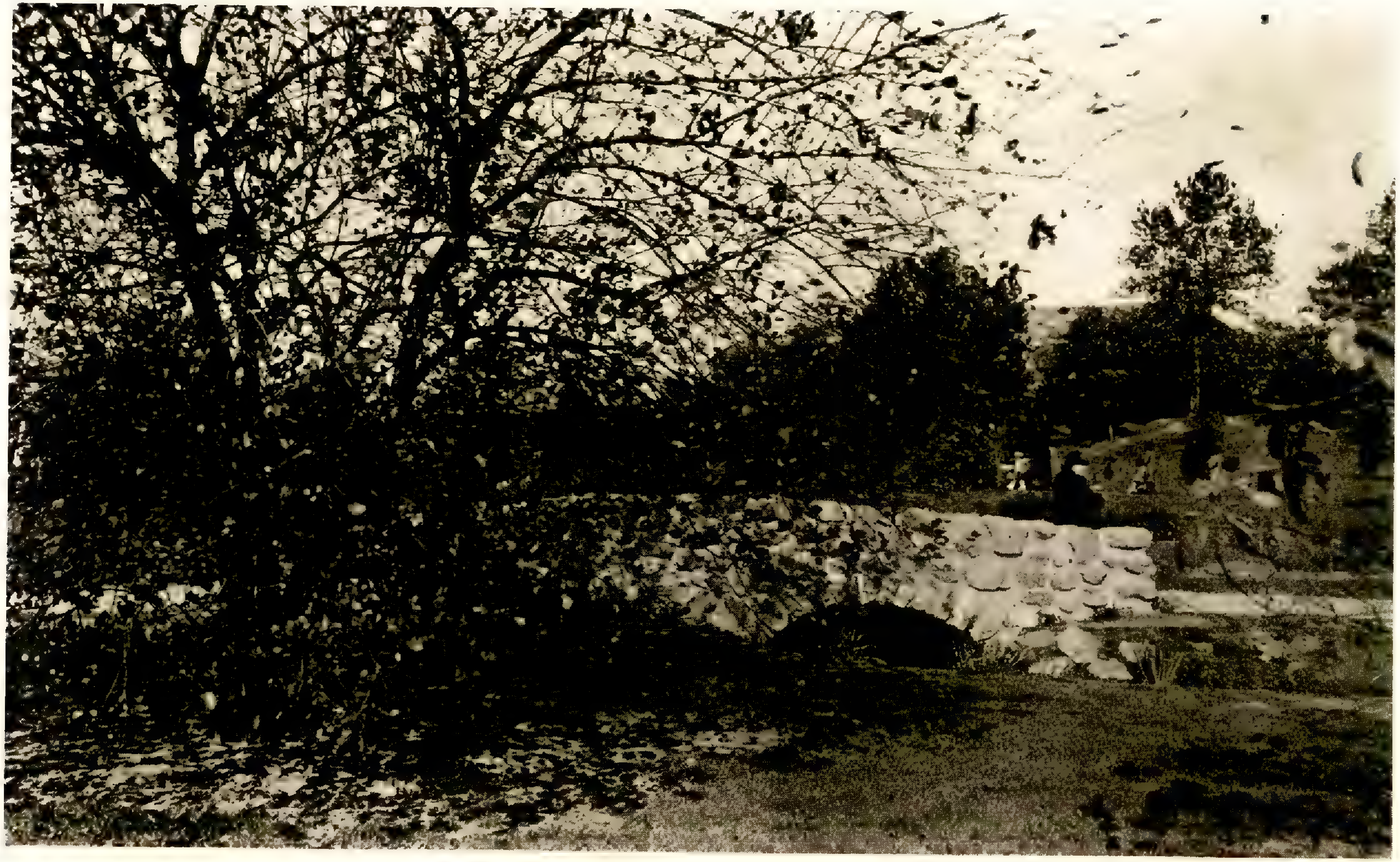

Fig. 2. Hills Boulder Bridge, facing northeast. Given by Mrs. John Hills. October 30. (6581.)

## Fitness of the Environment

That an organism must keep adjusted to its environment is a fact long recognized, even before Darwin gave it new meaning by showing its significance in the evolution of more efficient types of organization. But in 1913 there was published a thought-provoking book by Prof. Lawrence J. Henderson, of Harvard University, entitled, *The Fitness of the Environment.* In this book the author elaborated the thesis that, while the organism must keep adjusted to its environment, the environment must be favorable to the organism, proceeding to show that the present environment of living things is the best that could be imagined for the welfare of existing types of life.

" Fitness is a mutual or reciprocal relationship between the organism and the environment," says Professor Henderson, and " fitness of environment is quite as essential a component as the fitness which arises in the process of organic evolution. . . . The one fitness is no less important than the other."

This was not a new conception, but it was restated by Professor Henderson in the light of recent advances in science, and its importance was emphasized. In particular, says the author, " while life is active there must be exchange of both matter and energy with the environment." The two principal requirements of the living organism which an environment must fulfill are such a supply of food and energy as may be necessary for stability of conditions and healthy functioning and growth.

### *Application to Institutions*

No principle is more important than this in the Ecology of an institution. However lofty its ideals, however efficient its organization, however much its services may be needed, no institution can long function nor function efficiently if it is not adequately supported, and support must come chiefly, if not wholly, from the immediate, local environment. No community should become parasitic upon its public institutions, any more than they should become parasitic upon their communities. In particular, a community that is continually asking as well as receiving services from a local institution, places itself under a very real obligation to support that institution.

## Environment of the Brooklyn Botanic Garden

The environment of the Brooklyn Botanic Garden has been a favorable one. Property with an assessed valuation (in 1928) of $7,000,000 and located near the center of population of the City has been assigned to it as a site; some $300,000 (supplemented by about $150,000 of private funds) have been appropriated by the city for buildings and other permanent improvements; and appropriations for maintenance have been made during the past 18 years in the annual tax budget of the City, supplemented (as in the case of the permanent improvements), by private funds which now, for the second year, exceed in amount the sum appropriated by the City.

When a private individual, not a resident of Brooklyn, pledged $250,000 toward the permanent endowment of the Garden, the citizens of Brooklyn (and other Boroughs) made generous contributions in the total sum of nearly $254,000 to supplement and secure the initial pledge. The authorities of the Brooklyn Botanic Garden have a lively appreciation of these generous gifts from individuals as well as of the appropriations of the city government.

## Potential Environment

But what a man does is rightly estimated in terms of his capacity for accomplishment. The outstanding historic illustration of this is the widow's mite. The physicist recognizes *potential energy,* which is capacity for doing work, and *kinetic energy,* which is measured by work actually done. This is frequently illustrated by the water in a mill pond, which represents stored energy, available but not being put to use. When the water gates are opened the water flows into the machinery of the mill and useful work is accomplished—the mill turns out what the people need.

The resources of a city represent potential energy; its educational and scientific institutions represent mills capable of turning out products which are essential to the life of the community; but they are not able to function if the necessary energy, in the form of moral and financial support, is not made available in sufficient amount to keep the machinery running. All of this is, of course, a truism, but truisms often need reiteration and fresh emphasis.

## Potentialities of Brooklyn

Perhaps there is no better way to estimate the capacity of Brooklyn to support its scientific and educational institutions than to quote its own statements of its resources, as compared with those of other cities. The following information has recently been published in *Brooklyn,* the weekly bulletin of the Chamber of Commerce.

Brooklyn, with over 2,200,000 population, is the third largest urban community in the United States, being exceeded only by Greater New York, of which Brooklyn is a part, and by Chicago. During the first six months of 1928 fifteen new banking offices were opened in Brooklyn and the total resources of all of Brooklyn's banks increased by $641,366,572, bringing the total to more than $7,500,000,000.

In the five year period (1923–1928) deposits on hand in Brooklyn Savings Banks have approximately doubled, and from September 1927 to September 1928 the amount of these deposits increased from over $936,000,000 to over $1,029,000,000.

The average weekly factory earnings in September 1928, were $29.98, a figure not surpassed in over five years.

Brooklyn inhabitants support over 100 theatres with a seating capacity greater than the population of the entire State of Nevada. It is conservatively estimated that the people of Brooklyn spend annually not less than $25,000,000 for admissions to theatres. The assessed valuation of these theatres is $50,000,000.

A recent speaker before the Brooklyn Rotary Club has called attention to the following facts:

The population of Brooklyn is greater than the combined populations of Arizona, Delaware, Idaho, Nevada, New Mexico, and Wyoming. Since 1910 (the year the Botanic Garden was established) it has added an average of 3,200 people each month to its population.

Brooklyn educates in its public schools each year as many pupils as Baltimore, Milwaukee, Pittsburgh, Toledo, and San Francisco. It has over 38 per cent. of all the pupils in Greater New York, while Manhattan has less than 36 per cent.

Brooklyn leads the country in Postal Savings gains. One half the foreign commerce carried through the port of New York and one quarter of the foreign commerce of the entire United States is handled from Brooklyn docks. Over 40 steamship lines with a combined fleet of over 700 vessels sailing to all parts of the world have their home port in Brooklyn. Newtown Creek (in Brooklyn) handles a greater shipping tonnage per year than does the Mississippi River in its 1000 miles from St. Paul to New Orleans.

Brooklyn produces more manufactured goods per year than Pittsburgh and Minneapolis together. It ranks first in the entire world as a center for the importation, refining, and distribution of sugar, and first in the importation, roasting, and distribution of coffee. In industrial production it ranks fourth in the entire United States. It has over 200 miles of total wharfage or nearly 35 per cent. of the total for Greater New York. *Brooklyn ranks first in the United States in the number of pupils (approximately 500,000) in its 350 schools;* its citizens own 200,000 automobiles and rent nearly 350,000 telephones. The products manufactured in Brooklyn total over $1,200,000,000 annually.

A striking illustration of the general prosperity of Brooklyn's citizens is found in the Report of the Tenement House Commission, issued December 1, 1928, giving a survey of apartment house facilities, range of rents, and number of vacancies of apartments of various price-classes. Of a total of 394,883 apartments only about 7 per cent. are vacant. Of those renting for $60 a month or less 12–25 per cent. are vacant, while of those renting for more than $60 a month only one per cent. are vacant. The largest number of vacancies (25 per cent.) occurs in the $30 a month apartments; $100 a month apartments are only 1.6 per cent. vacant, $150 a month, one half of one per cent., and $200 a month, two tenths of one per cent. Nearly three quarters of the vacancies (70 per cent.) are where rents are $50 a month or less. The vast majority of the people of Brooklyn are apparently able to live in the higher priced apartments.

## Support of Science and Education in Brooklyn

Surely a community of such relative and absolute resources should be the most favorable environment imaginable for institutions whose object is to promote the educational and cultural welfare of the community. It is stimulating and inspiring to draw such comparisons as those quoted above in the realms of business and commerce. It is illuminating to draw similar comparisons with reference to the support of science and education. The writer has made such comparisons. This is not the place to report the results. The question is one, however, concerning which any Chamber of Commerce, and every citizen may well feel deep concern. Many industries have deliberately chosen to locate in a given city because of its generous park spaces and provision for the health and recreation of their employees; cities have been rejected as sites because of their lack of such advantages. In other words, industry does recognize other than financial needs—the importance of factors not immediately concerned with the conduct of a business.

Many individuals have chosen their city of residence, not because of its bigness, or the mileage of its paved streets, or the bulk of its commerce, but because of the educational and cultural advantages it afforded.

It may not be practicable for Brooklyn to have the biggest botanic garden in the world, but the facts given above clearly indicate that there is no reason why it should not have one of the best, so far as quality can be secured by adequate financing.

## Prosperity and Botany

Few people realize the debt of industry and commerce to botany, and even to botanic gardens. For example, the extent to which Brooklyn (like every city) is profiting each year from the rich variety of first class fruits and vegetables on sale in its markets, at prices within reach of all, places it under very definite indebtedness to botanical research. These products are the result of botanical exploration, plant breeding, plant pathology, and other departments of botanical science.

According to the United States Census for 1927 (the latest figures available), the value of bread and other bakery products produced in Brooklyn in 1927 was nearly $47,300,000. The foundation of this industry is the wheat crop and other cereal grain crops. The success of these crops depends upon the work of the plant breeder and the plant pathologist. Without the modern varieties of grain, grown under the present conditions of plant disease control, the figures for the annual value of the baking industry (not to mention all the industries that intervene between the wheat field and the loaf of bread) would be materially less and the cost of bread would be correspondingly higher. The indebtedness is directly to botany.

Food preparations manufactured in Brooklyn in 1927 had a value of nearly $23,000,000; confectionery, of over $17,000,000. The cost of sugar and the consequent percentage of profit in the confectionery business rests in large part on the perfection of the sugar beet by the plant breeder, who increased its sugar content from seven per cent. to 16 per cent. for commercial stock. To obtain this result required a knowledge of the structure of flowers, the functions of their various parts, and other purely botanical matters. Plant pathology and plant breeding have now become vital factors in connection with the growing of sugar cane. The confectionery business, and in fact the whole sugar industry, is founded upon the science of botany.

Electrical machinery, apparatus, and supplies manufactured in Brooklyn in 1927 had a value of nearly $31,000,000. The entire electrical industry, and every other industry involving the use of rubber (the entire automobile industry, for example) is chiefly dependent for its supply of rubber on the product of trees raised at the Royal Botanic Gardens, Kew, from seeds collected in Brazil in 1875.

Economic advantage is not the most powerful argument for the support of scientific research, but the fact that botanical investigations do yield results of the highest importance to commerce and industry places the business world (even in its own interest) under definite obligations to support such investigations. Statistics recently published by the United States Chamber of Commerce record the fact that American manufacturers are now spending $35,000,000 annually for research, and that *$500,000,000 is saved each year as a result.* All of this advantage rests ultimately upon the bed rock of research in pure science, undertaken and carried on without thought of financial return.

There is no longer any question but that business is going to support scientific research. The question for Brooklyn to decide, is whether it wishes to become a center for such work; to be specific, whether it does not wish its Botanic Garden to be one of the outstanding institutions of its kind.

### What the Botanic Garden Needs

The above heading has appeared in several preceding annual reports. When the Botanic Garden ceases to have needs it will have ceased to be a live institution.

In the first place, a certain proportion of our work is now dependent for financial support upon uncertain and fluctuating contributions received in fulfillment of pledges renewed annually, or from equally varying income from membership dues and tuitions. From year to year we are never quite certain whether work must be curtailed nor whether certain appointments can be continued. This gives a feeling of insecurity and apprehension, a lack of assurance and of permanent foundation which is not conducive to the most substantial accomplishment nor to the building up of an enduring organization.

In the second place, much of our present work is underfinanced. Most salaries are below the prevailing rate in other institutions of similar grade and ideals. The Garden is at a disadvantage in filling vacancies and manning new positions.

For lack of sufficient funds the development of our plantations is lagging; the plants and lawns, while reflecting credit on those responsible for their upkeep, still have insufficient care; the grounds are inadequately guarded; our scientific work (foundational to all of our other activities) cannot expand in a normal and healthy manner; our school service is not adequate to ever increasing demands; the needs of our library and herbarium can be met only in part; the publication of guides to the plantations has been too long delayed; suitable entrances at all of our gates are still to be provided.

If this statement, by chance, reminds the reader too strongly of Jeremiah, let me hasten to add that it is not intended, by any means as a lamentation. It is made because the exact situation should be realized by everyone who is interested or who ought to be interested in the welfare of the Garden and the good name of Brooklyn. It will also serve to indicate that the Administration of the Garden is not blinded by the splendid successes made possible by the generous support which it has received, but is fully cognizant of its shortcomings and needs.

### *Municipal Obligations*

Many of the present needs should be met by increased appropriations in the annual Tax Budget of the City. Although the Private Funds Budget of the Garden has increased 110 per cent. during the past three or four years, the Tax Budget has increased only about three tenths of one per cent.

In a recent letter declining an invitation to become a member of the Botanic Garden, a citizen of Brooklyn alleged as his reason that he was now paying a substantial tax, and considered that such institutions as the Garden should be maintained by appropriations from the Tax Budget of the City. To such a one it may be pointed out that the per capita contribution, through taxes, to the support of the Brooklyn Botanic Garden is only four hundredths of one cent (0.04 cts.), or four tenths of a mill, on the basis of $95,000 appropriated and 2,200,000 population. The stamp our correspondent affixed to his letter cost nearly fifty times as much as his annual contribution to the support of the Garden through the payment of his taxes.

### *Opportunity for Private Initiative*

The needs of the Botanic Garden constitute a real opportunity for those of public spirit and civic pride, and there is something akin to moral obligation resting upon those of ample means, and equally upon those who use the Botanic Garden to an extent far in excess of what might be represented by the individual's share in the Tax Budget appropriation for the maintenance of the Garden.

### *President Coolidge on Memorials*

"One test of the civilization of any age," says President Coolidge, "is the regard which it has for the teachings of the past and the opinion of posterity. The Greeks and the Romans had these in high degree." Speaking of the Lincoln Memorial as "a magnificent inspiration," he continued: "The memorial idea is sound and is sure to grow as opportunities present themselves. One of the most encouraging signs is the tendency today to look to institutions of higher education for memorial sites . . . . To place your name, by gift or bequest, in the keeping of an active university is to be sure that the name and the project with which it is associated will continue down the centuries to quicken the minds and hearts of youth, and thus make a permanent contribution to the welfare of humanity." This statement applies, not only to universities, but with equal force to such an educational and scientific institution as a botanic garden.

### Importance of Healthy Growth

The Brooklyn Botanic Garden is still in its infancy. Its program of work and its departmental organization, laid out and approved at the beginning, are still far from being completely realized. Original needs for such service as the Garden aims to meet have greatly increased, and new demands arise each year as the City grows in size and the public becomes more fully aware of the existence of the Garden and the services it can render. Educational and scientific needs are opportunities which the Garden should be able to meet.

The director is prepared to show to anyone interested, itemized statements upon which the following summaries are based:

ADDITIONAL ANNUAL INCOME FOR WHICH PERMANENT PROVISION IS NEEDED

| | |
|---|---|
| 1. To place on a permanent and more nearly adequate basis activities already organized | $27,500 |
| 2. To provide for healthy expansion to meet increasing demands for a larger service | 27,500 |
| Total additional annual income to be assured in perpetuity by additional endowment | $55,000 |

An endowment fund of $1,000,000 at 5.5 per cent. would insure this income.

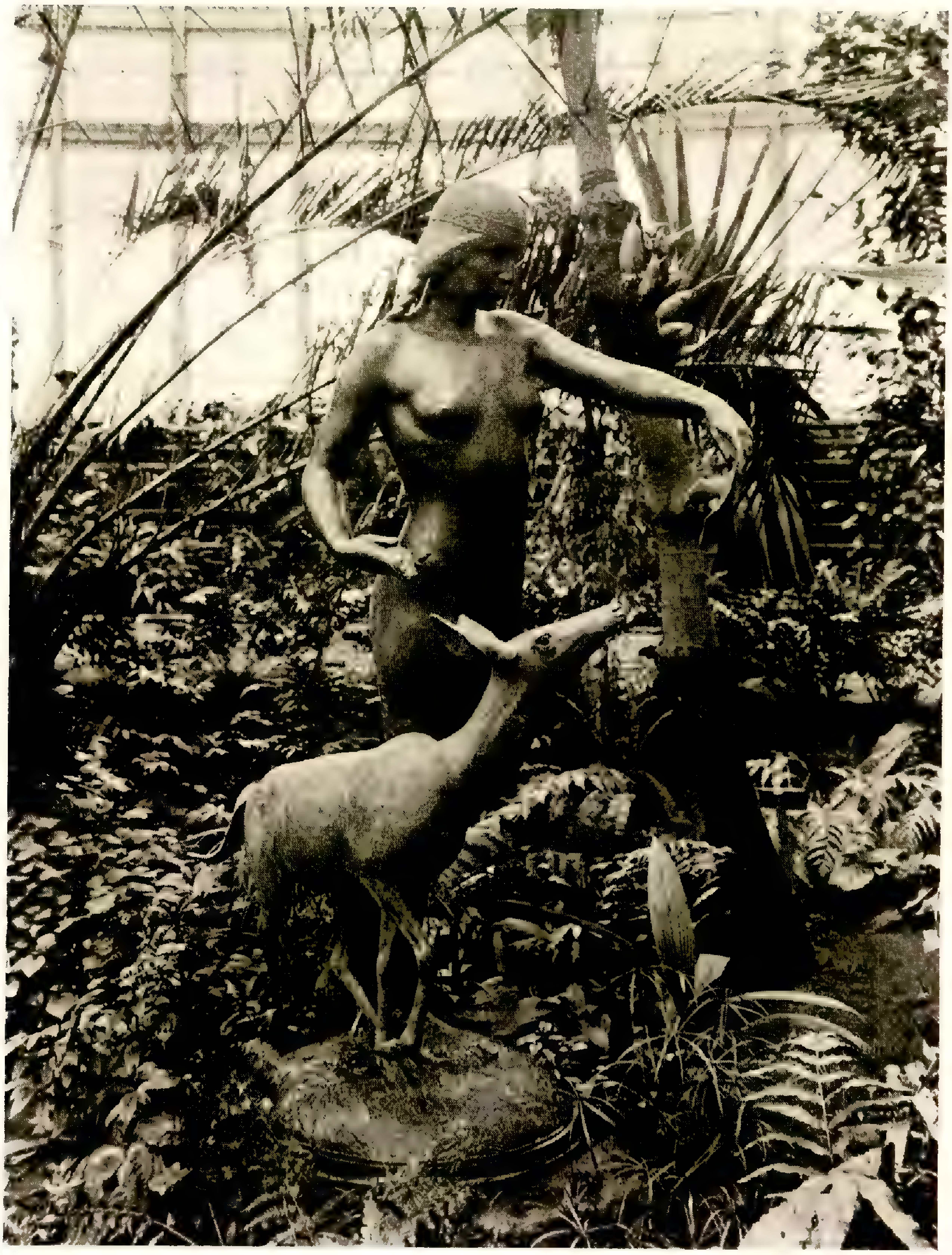

Fig. 3. Indian Maid and Fawn, by A. Phimister Proctor. Given by George D. Pratt, May 8. (Photo by A. B. Bogart.)

## Miscellaneous Needs

While the authorities of the Garden should keep before them, until realized, the larger needs just indicated, we should also not lose sight of numerous minor requirements which individuals or organizations might be glad to meet if only the necessity were realized. Among such items may be mentioned the following:

### MEMORANDUM OF MISCELLANEOUS OBJECTS AND NEEDS

1. Garden seats; about fifty.
2. Completion of the Plaza in front of the Laboratory Building and Conservatories.
3. Fountain for the circle in front of the main entrance to the Conservatories.
4. Suitable structures at the various entrances to the Garden. These are now being designed.
5. Brass meridian and letters giving the Latitude and Longitude of the Brooklyn Botanic Garden, together with fund for their installation in the paved walk.
6. Sundial, to be installed near the brass meridian.
7. Bronze plate markers for glacial boulders.
8. Bronze plate labels to be placed at the entrances to the various groups of Plant Orders in the General Systematic Section.
9. Artistic sign boards to be designed and installed at suitable places on the grounds, directing visitors to different points of interest.
10. Bulletin boards to be placed just inside of the entrance gates. Six are needed.
11. A boulder bridge across the brook. Approximate cost not to exceed $2,500.
12. Additional stacks for the Library.
13. Additional cases for the Herbarium.
14. Educational Motion Picture films.
15. Funds for the publication of illustrated guide books, and books of views, as for example:
    - *a.* Guide Books.
        1. General Guide to the Grounds.
        2. The Japanese Garden.
        3. The Rose Garden.
        4. The Rock Garden.
        5. The Wild Flower Garden.
        6. General Systematic Section.
        7. The Ecological Garden.
        8. The Water Gardens.
        9. The Story of our Boulders.
    - *b.* Book of Views.

The approximate cost of each illustrated guide should not exceed $600.00. These would be for free distribution to Botanic Garden members, and for sale to others.

## Investigations during 1928

"Scientific research is a chief end of man for it is a supreme way of glorifying God," said an editorial writer in the New York *Times* for November 17, 1928. "What we know is but little, what we do not know is immense," said the great mathematician and astronomer, La Place. The realm of the unknown is so vast, and the limitations of the investigator are so great that human knowledge progresses by advances that are, comparatively speaking, infinitesimally small. This is one of the reasons, perhaps the chief reason, why it is difficult to interpret scientific research to the layman, especially to business men. Annual dividends seem to them small, and the business, therefore, not prospering. Almost every important advance of science is the result of several to many years of painstaking study, often by several investigators. This element of time, however, is not peculiar to science. Recalling that Darwin labored twenty years in preparation for writing his "Origin," we should also remember that Lorenzo Ghiberti worked forty years, "with a patience and industry more than extreme," to complete the two doors of San Giovanni, in Florence.

One of the drawbacks to effective scientific work in governmental institutions, such for example as our Agricultural Experiment Stations, is the demand of legislators and voters to be shown *results* at yearly intervals. That the labors of an entire year may have served to reveal chiefly what *isn't* so, rather than what *is* so; to uncover more new problems than have been solved, is often difficult for them to understand. Such results, while invaluable in the laboratory, are not applicable in garden and orchard and field; while they may inspire the investigator, they are not apt to inspire adequate appropriations of funds to carry on the work.

Herein lies one of the important reasons and needs for privately endowed institutions of research, such as our botanic gardens. This need was emphasized by the Secretary of Agriculture, Mr. Jardine, in the quotation on the front cover page of Brooklyn Botanic Garden RECORD for July 1927, where he referred to botanic gardens as institutions that "offer opportunities for a thorough investigation of many important long-time problems which are difficult, if not impossible, for any other institution to satisfactorily provide."

Non-technical reports of progress in research at the Garden are given on pages 52–66.

## Plantations and Grounds

### *Gardening Operations*

Spring work on the grounds opened on April 2, and out of doors work continued until the very end of the year. In addition to routine maintenance of lawns and the cultivation of plants, the area devoted to the Pea Family has been replanted according to a new plan prepared at the director's request, by the consulting landscape architect, Mr. Caparn. One object of the revised plan is to show, more effectively than hitherto, the use of plants of this group in herbaceous borders. Other changes are noted in the appended report of the horticulturist.

### *New Boulder Bridge*

When the first paved walks were laid down in 1914, two temporary wooden bridges were constructed across the brook. It was anticipated that these would be replaced in one or two years with suitable permanent structures. Funds have never been provided for this, and the bridges became so weak that motor vehicles, crossing them in emergencies (automobiles are not, as a rule, admitted to the Garden), twice broke through. The bridges also reached a condition where further repair was almost out of the question, and where the need of new bridges was all too evident. At our Spring Inspection last May Mrs. John Hills, a member of our Woman's Auxiliary, recognized this need, and generously offered to provide the funds for one of the new bridges. This very timely gift not only met an urgent practical need, but has provided a structure which adds greatly to the appearance of the Garden (Fig. 2). The new bridge was designed by the consulting landscape architect and constructed by the firm of John Thatcher & Son, the total cost being $1,441.

The other temporary bridge is still an opportunity for some generous friend of the Garden. It is included in the list of minor needs on page 33.

### *Undeveloped Area*

The North Addition, between Mt. Prospect Reservoir on the west and the Brooklyn Museum properly on the east, still (for the 15th year) remains undeveloped for lack of sufficient labor.

## Rose Garden

The season of 1928 was the first for the new Rose Garden, presented in 1927 by Mr. and Mrs. Walter V. Cranford. The garden was first opened to Botanic Garden members on the occasion of the annual Spring Inspection, May 8.

### *First Annual Rose Garden Day*

The First Annual Rose Garden Day was held on Thursday afternoon, June 21, from 3:30 to 6 o'clock, and the garden was first opened to the public on the following Sunday afternoon, June 24, at 2 o'clock. The Pre-View, June 21, was for City officials, Members of the Board of Trustees, Woman's Auxiliary, and invited guests, and the formal exercises were held in the Laboratory Building on account of rain. Brief remarks were made by the following:

1. President Blum, of the Board, expressing appreciation of Mr. Cranford's gift.
2. Mr. Robert Pyle, Secretary and Official Delegate of the American Rose Society (M.S. read by Dr. Gager, as Mr. Pyle was obliged to leave early).
3. Mr. Harold A. Caparn, landscape architect, explaining the plan of the Rose Garden.
4. Mr. Frederick L. Atkins, Official Delegate from the New York Horticultural Society.

At the suggestion of President Blum the following telegram was sent at 4:55 p.m. at the conclusion of the exercises.

"Mr. Walter V. Cranford,
Greenwich, Conn.

"Members of our Board of Trustees and Woman's Auxiliary, enjoying and admiring the Rose Garden this afternoon, between showers, have requested me to send to you their regrets that you and Mrs. Cranford could not be with us, and their enthusiastic appreciation of your beautiful gift."

An impromptu tea was served in Room 327 at the conclusion of the exercises.

### *Weather Difficulties*

An unusual amount of rain, distributed throughout the summer, made it very difficult to maintain the roses free from insect and fungus pests. This was done, however, with a large measure of success under the supervision of the horticulturist, Mr. Free. Mr. Sydney R. Tilley, foreman gardener, has given his entire time to the Rose Garden, which has also required practically the entire time of a gardener. The proper maintenance of the Garden will require the time of two men regularly.

Needless to say, the Rose Garden has already proved to be of great popular interest, adding both to the beauty and the educational value of the plantations. Most generous gifts of roses from several donors are acknowledged on page 112 of this report.

Because of lack of men for guard duty, and also on account of the newness of the lawn, the Rose Garden has not been open on Sundays and holidays, except on June 24, as noted above.

## Library

### *Return of Loaned Books*

The appended report of the librarian records the return to the Brooklyn Public Library, on November 7, of two valuable sets of periodicals indispensable for almost daily reference in a botanic garden—Curtis's Botanical Magazine, London (151 volumes), and Annals of Botany, London (41 volumes).

The Garden was notified that the return of these sets, loaned in 1913 and 1914, respectively, would be desired as soon as the new building (now nearing completion at the corner of Eastern

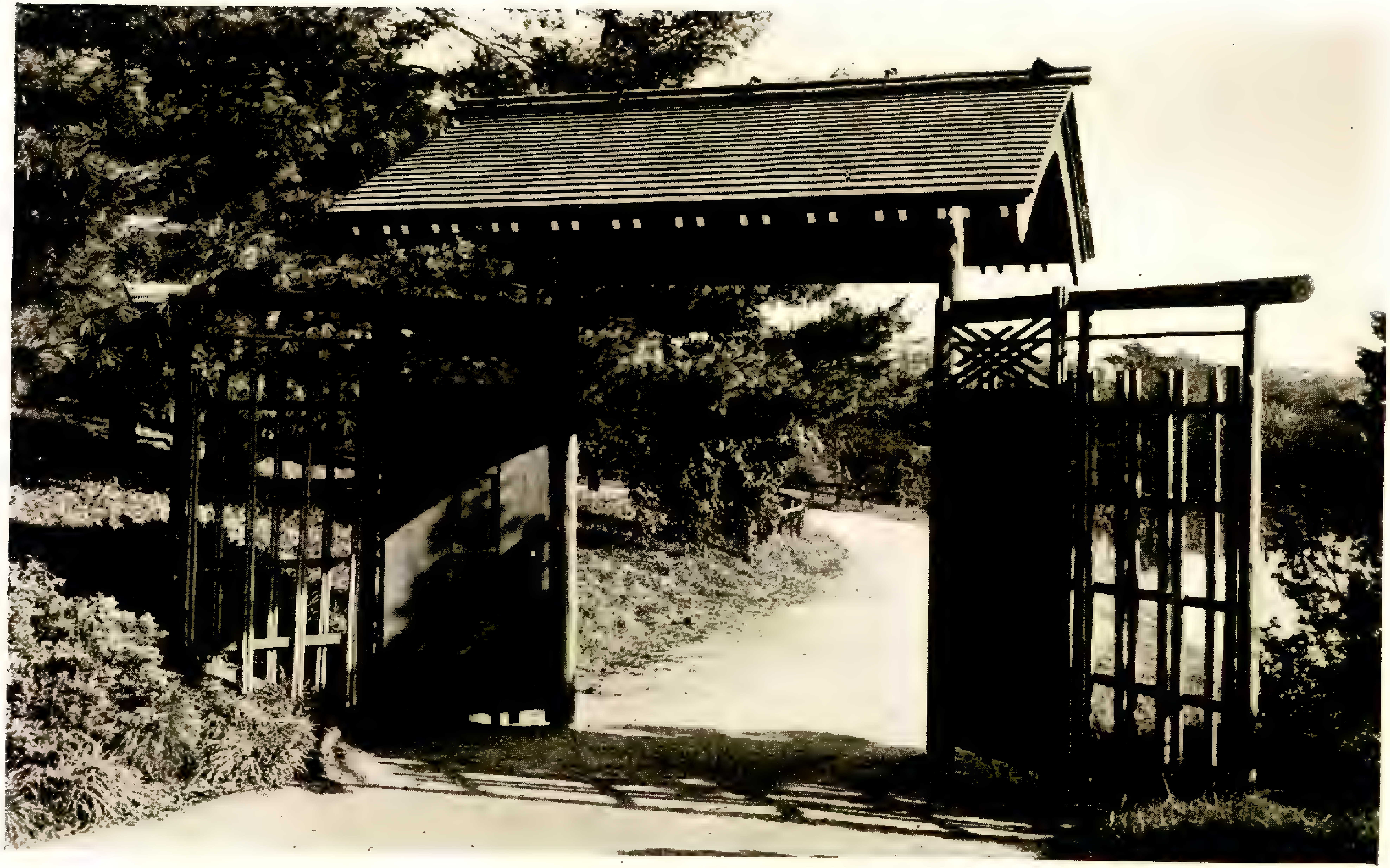

Fig. 4. Japanese Garden Gate, north side of lake. November 9. (6585.)

Parkway and Flatbush Ave.) was occupied by the Public Library. It was found possible to purchase this year complete sets of each of these journals, and as complete sets come on the market only at long intervals, and as the Brooklyn Public Library was unwilling to sell its sets to the Garden, the purchases were made now so as to make sure that the publications would be continuously accessible at the Garden.

The Botanic Garden records here its deep appreciation of the generosity of the Brooklyn Public Library officials and the Chief Librarian, Mr. Frank P. Hill, in placing these books on loan in our own library for the past fifteen years.

### *Binding*

One of the major items of expense in all libraries is binding. The librarian reports that during the year she has succeeded in completing 1,200 volumes of Reports, Circulars, and Bulletins of State Agricultural Experimental Stations, and the U. S. Department of Agriculture. These are all unbound. The present needs for binding are as follows:

| | | |
|---|---|---|
| State and U. S. Gov't Publications | 1,200 | volumes |
| Periodicals received in parts | 1,000 | " |
| Books published with paper covers | 100 | " |
| Rebinding | 700 | " |
| Total | 3,000 | " |

### *Increased Use*

Special attention is called to the greatly increased service demanded of the library in the way of bibliographical work, the answering of questions, and the serving of readers, as noted in the librarian's appended report.

### *Additional Shelving Needed*

With accessions hovering around 7,000–9,000 volumes, pamphlets, and parts (9,740 for 1928) for the past five or six years, the original shelves are now nearly full, and the installation of shelves on the entire second floor is an acute need.

## Herbarium

### *Additional Cases Needed*

The Herbarium has grown to greater proportions than was anticipated when the Garden was established in 1910. The present cases are full, and considerable material is now in storage, practically inaccessible for ready reference. New steel shelving, installed in the Herbarium work room on December 20, will partially remedy this condition. In order to provide for present needs and future expansion, a mezzanine floor should be constructed in the main Herbarium room. This would make it possible to provide cases so as to nearly double the present capacity.

## Gifts

A list of the names of donors and gifts may be found on pages 111 and 118 of this Report. The gifts have been acknowledged with the thanks of the Botanic Garden Governing Committee, and it is a special pleasure to make public acknowledgment of them here.

## Membership

Membership in the Botanic Garden confers certain privileges not enjoyed by the general public; it should also be considered as an opportunity for public service through cooperation in and support of a work of such large civic importance.

The total number of members of all classes (as of February 21, 1929) is 1,207. During 1928, membership privileges were extended to all those who contributed $25.00 or more to the Citizens' Endowment Fund, subscribed in 1926. The list of members is given on pages 134–148.

### *New Life Members*

In consideration of gifts in excess of the $500.00 requisite for qualification as Life Member, the following have been elected to Life Membership:

Mr. Lambertus C. Bobbink and Mr. Frederick L. Atkins, of the firm of Bobbink & Atkins, nurserymen, Rutherford, N. J.

Mr. George P. Engelhardt, Brooklyn, N. Y.
Mr. Fred D. Osman, proprietor of New Brunswick Nurseries, New Brunswick, N. J.
Mr. Edwin H. Thatcher, of John Thatcher & Son, Brooklyn.
Mrs. John Hills, 715 St. Mark's Ave., Brooklyn.

## Fourteenth Annual Spring Inspection

At the Spring Inspection of the Garden by trustees, members, and invited guests, held as usual on the second Tuesday in May, the weather was delightful. The new Rose Garden was opened to members for the first time (thought not yet opened to the public), and the first bubbler drinking fountain, installed on the north side of White Oak Circle, was viewed for the first time. Also, three pieces of sculpture by Miss Isabel M. Kimball, of Brooklyn, were exhibited. Two of them were models for two terminals (Winter and Summer), seven feet high, and were placed in the Rose Garden. The third piece was a small bronze statuette, "The Merchild," temporarily placed at the foot of the waterfall at the outlet of the swamp in the Ecological Garden. These pieces were loaned by Miss Kimball. Subsequently "The Merchild" (Fig. 5) was presented to the Garden by Mr. Richard R. Bowker, a member of the Board of Trustees. The Botanic Garden has received from the Art Commission, City of New York, Certificate No. 3521, July 19, 1928, approving the design and location of this statuette.

The indoor feature of the Inspection was an exhibit illustrating the Educational work of the Garden. As usual, the Inspection was in charge of the Woman's Auxiliary, Mrs. Glentworth R. Butler, Chairman. Miss Alice Brinsmade was chairman of the special committee of arrangements. The attendance was about 900. Acknowledgment is here made of the cooperation of the members of the Auxiliary, and especially of numerous gifts of flowers, refreshments, and various utensils necessary in connection with the serving of tea.

## Cooperation

As usual, the Garden has been in active cooperation during the year with many Governmental departments, and public and private institutions and organizations; among others the following:

United States Government.

- *a.* Bureau of Immigration, by supplying propagating material for the greenhouses at Ellis Island.
- *b.* Office of Forest Pathology, Bureau of Plant Industry, by cooperation in chestnut bark disease and other investigations.

New York State Government, through the office of the State Botanist.

New York City Municipal Government, through the Departments of Parks, Education, and Health.

Merchants Association of New York City, by membership of Director of the Garden on the Association's Committee on Plant Quarantines and their Administration.

Brooklyn Chamber of Commerce, through membership in the Civic Council of the Chamber, and through contributions to *Brooklyn,* the weekly organ of the Chamber.

National Research Council, Washington, D. C., by contributions to the fund for financing the International Committee on Botanical Nomenclature.

University of Glasgow, Scotland, through supply of living plants for research work.

Countryside and Footpaths Preservation National Conference and Exhibition, and Society for the Promotion of Nature Reserves, England, by supplying Brooklyn Botanic Garden Leaflets bearing on conservation.

Campfire Girls, through our Departments of Education.

One hundred and forty botanic gardens, distributed in 40 different countries, through exchange of seeds and publications.

Botanical Society of America, Ecological Society of America, and Editorial Board of *Genetics,* through publication of journals issued under their editorship.

American Association for the Planting and Preservation of City Trees, the American Nature Study Society, and New York Bird and Tree Club, in connection with meetings, officers, and propaganda.

Many Garden Clubs and other organizations, through supplying speakers and otherwise.

New York Horticultural Society in connection with the Annual Flower Show and otherwise.

School Garden Association of New York in distribution of seeds to children and publication of Tree Study Calendar.

Girl Scouts in the installation of a garden booth at the Brooklyn Girl Scout Carnival and Demonstration, April 13 and 14, at the 13th Regiment Armory; also in other ways.

Boy Scouts in the giving of an exhibition in the Laboratory Building at the Garden, attended by over 4,700.

The list could be prolonged for several pages. The above cases were chosen to illustrate diversity and geographical range.

## What Price Smoke

*What Price Smoke* is the title of Bulletin III, March 1928, published by the National Conference Board on Sanitation in co-operation with the Department of Health of New York City. The first page contains a statement from the Director of the Botanic Garden on the effect of smoke and fumes on the vegetation in the Garden.

I have mentioned the seriousness of this situation in previous reports to our Board of Trustees, and emphasized it in the Fifteenth Annual Report of the Garden (for 1925).

According to the Bulletin just cited, data have been assembled which show that the excess of smoke and soot in the atmosphere of New York City costs the City, annually, $16 per capita, or a total of $96,000,000.

It is largely because of soot and poisonous fumes in the atmosphere that trees and shrubs in Central, Prospect, and other parks are in such distressing condition. In our judgment, it is this factor, more largely than any other, which made necessary the appropriation of $871,420, by the Board of Estimate on January 26, 1928, for the rehabilitation of the City's parks.

The monetary loss to the Brooklyn Botanic Garden on this account has been considerable, not to mention the great hindrance to the development of our plantations, and the fact that many kinds of evergreen trees and shrubs cannot be grown at all in the Botanic Garden.

## Flower Days

Announcements were mailed to all members of the Board, the Auxiliary, and the Garden, of four flower days, as follows:

June 1, Iris Day. Guide, Dr. G. M. Reed.
June 15, Rock Garden Day. Guide, Mr. Montague Free.
Sept. 21, Water Lily Day. Guide, Dr. A. H. Graves.
Oct. 5, Canna Day. Guide, Dr. Gundersen.

On June 1, the American Iris Society combined their Iris Day with ours, meeting at the Garden in the forenoon, and at the Iris Garden of Mr. Robert Wayman, Bayside, L. I., in the afternoon. Box lunches were eaten at the Garden.

About 100 (out of 300) varieties of Bearded Iris were in bloom, and about 30 (out of 60) varieties of Beardless Iris.

*Lilac Day for Public Schools* was observed on May 31, when pupils from P. S. 6, 36, 109, and 206 visited the Garden and viewed the lilacs under guidance of a Garden docent.

## Public Exhibits

*International Flower Show,* March 19–24, at Grand Central Palace, under the auspices of the New York Horticultural Society and the Garden Club of America. The Garden is under obligations to the Garden Club of America for space for a booth featuring our public educational work.

*Parents Exposition* of the United Parents Association of Greater New York Schools, Inc., at Grand Central Palace. An exhibit similar to the Flower Show exhibit, featuring our educational work.

*Spring Inspection,* May 8. An exhibit illustrating the educational work of the Garden.

*Exposition of Women's Arts and Industries,* at the Hotel Astor, October 1–6, featuring the work of our Department of Elementary Instruction.

Other exhibits installed during 1928 are noted in the appended reports of the curator of public instruction (pages 82–83) and the curator of elementary instruction (pages 93–94).

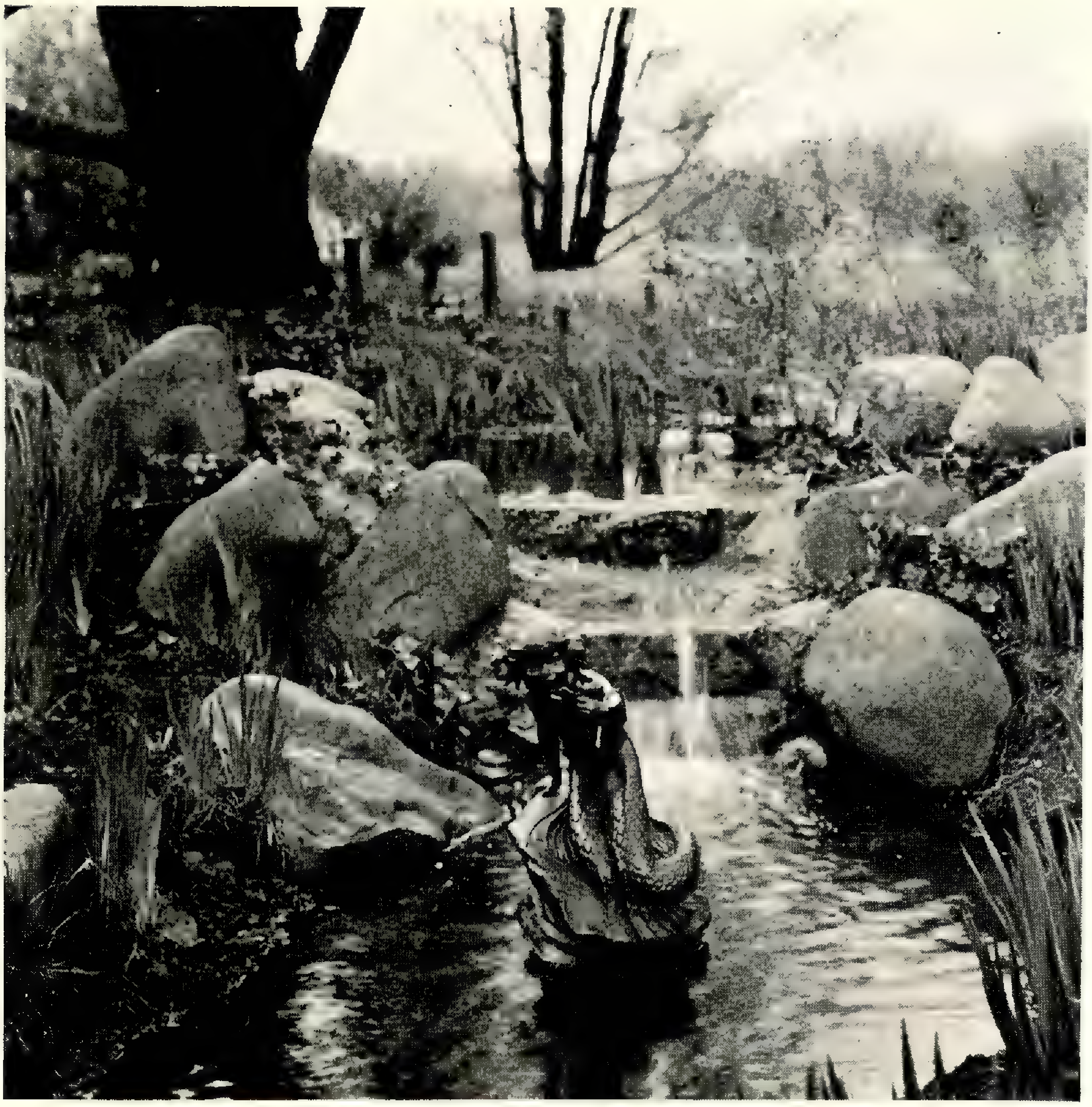

Fig. 5. The Merchild. Statuette by Isabel M. Kimball. Presented by Richard R. Bowker. Temporary installation on a boulder in the Brook. June 8. (6491.)

## Appointments

Belle H. Burr, A.B., curatorial assistant in the Herbarium, September 27.

Frances Miller MacKinnon, A.B., stenographer, January 9.

Elizabeth Marcy, A.B., instructor, Department of Elementary Instruction, September 1.

Andrew B. Newell, janitor, October 1.

Constance Purvis, stenographer, February 27.

Norma E. Stoffel, office assistant in the business office, February 28.

Alys Sutcliffe, gardener (with special reference to the Rock Garden and the Department of Elementary Instruction) April 1.

Evelyn M. Williams, stenographer, October 1.

## Resignations

Dorothy Barnett, B.S., curatorial assistant, Department of Plants, since October 24, 1927, resigned September 1.

Ruth Blankley, library assistant and stenographer, October 16, 1925 to January 23, 1928, and stenographer, Department of Elementary Instruction from that date. Resigned October 1.

Bertha L. Edwards, stenographer in business office. Resigned August 31.

Herman Kolsh. Mr. Kolsh was one of the first employees of the Garden, coming as a gardener in 1911, the year in which our outside work on the grounds began. In 1912, he was made foreman gardener, and has held that position continuously until the end of 1928, his resignation taking effect on December 31, on account of ill health.

Alexandra Dodd Schultze, curatorial assistant in the Herbarium since February 14, 1927, resigned November 1.

Alvhild Linnea Wiman, library assistant and stenographer from December 1, 1924, to October 3, 1925, and stenographer, Department of Elementary Instruction, since that date. Resigned January 31.

Ethel V. Woodward, curatorial assistant in the Department of Plant Pathology and Elementary Instruction, February 1 to June 15, 1925, and instructor, Department of Elementary Instruction since that date, resigned January 31.

Gladys Glenn Zunser, library assistant, resigned February 6.

## Deaths

Mr. Frank Kiernan came to us as night watchman on January 19, 1919. On March 28 of the same year, he was promoted to the position of janitor and held that position until his death, after a very brief illness, on September 12, 1928. His uniform courtesy, his efficient discharge of the duties of his position, and his loyalty to the Botanic Garden made him a most valuable man, held in high regard by all, and his passing was a distinct loss to the Garden.

## Miscellaneous

*A Bronze Statue,* Indian Maid and Fawn, by A. Phimister Proctor, presented on March 8, 1927, by Mr. George D. Pratt, was placed in the Economic House of the Conservatories early in April. The statue is a work of much beauty (Fig. 2).

*Propaganda for Gardening.*—City vegetable gardens are largely a thing of the past, and even in villages and suburbs the "back-yard garden" is becoming less common. According to Mr. C. H. Nissley, of the New Jersey Agricultural Experiment Station, the wartime interest in vegetable gardens has either given place to flower gardens, or has been abandoned in favor of the automobile. This is reflected, among other ways, by the falling off in the sales of vegetable seeds put up in packets for the small gardener. These sales throughout the United States, have decreased 13 per cent., while the sale of flower seeds has increased 11 per cent. during the past three years.

Interest in small gardening, with both vegetables and flowers has been greatly stimulated by a series of 39 articles by the curator of Elementary instruction, Miss Shaw, which have been running during the past year, for the second season, in the New York *Sun.* The *National Business Review,* published in New York City, had a half column comment in its issue for March 15, calling attention to these articles.

Our supply of Penny Packets of Seeds to school children also takes on an added importance in view of the diminishing interest in gardening.

*Summer Absence of the Director.*—Under special leave of absence granted by the Botanic Garden Governing Committee, the director was absent from July 9 to October 8, visiting other botanic gardens and collecting plants and seeds in Arizona, California, and Canada. About twenty botanical institutions were visited and a number of new exchange relations were established.

*Japanese Doll Day.*—On March 5, several thousand pupils from the public schools visited the Japanese Garden as part of the exercises arranged by the schools in connection with Japanese Doll Day.

## Financial

### *Tax Budget Accounts*

The initial Tax Budget appropriation for 1928 was as follows:

| | |
|---|---|
| Personal Service | $72,253.00 |
| Other Codes | 15,805.00 |
| Total | $88,058.00 |

On May 3 the Board of Estimate and Apportionment adopted a resolution (Calendar No. 24–A) transferring funds from Code 3070, Miscellaneous, New York City, for adjustments of personal service and expenses in the various Public Libraries, Zoological Garden, Botanical Garden, Museums, Aquarium, and the Institute of Arts and Sciences to Brooklyn Botanic Garden Code as follows:

Code 1360. Salaries Regular Employees.............. $1,621.50

On June 7, 1928 the Board of Estimate and Apportionment took the following action (Calendar No. 196–A), in response to our request of May 11, 1928 for additional labor and materials for the purpose of painting the iron fence surrounding the Garden:

Resolved, That the Board of Estimate and Apportionment, pursuant to the provisions of section 237 of the Greater New York Charter, hereby approves of the transfer of funds within appropriations made for the year 1928, as follows:

FROM

MISCELLANEOUS, CITY OF NEW YORK

| | | |
|---|---|---|
| 3070. | For Adjustments of Personal Service and Expenses in the various Public Libraries, Zoological Garden, Botanical Garden, Museums, Aquarium, and the Institute of Arts and Sciences | $1,400 |

TO

BROOKLYN INSTITUTE OF ARTS AND SCIENCES, BOTANIC GARDEN AND ARBORETUM

| | | | |
|---|---|---|---|
| 1360. | Wages Temporary Employees | $ 825 | |
| 1361. | Expenses for Other than Personal Service | | |
| 9. | General Plant Materials | 575 | $1,400 |

During the latter part of the year it became evident that the Garden could no longer depend upon hired horses for carting, agricultural operations, and snow plow. The increased use of the automobile has made it no longer profitable to keep work horses for hire in this City. Consequently, on September 20, 1928, we made application to the Board of Estimate and Apportionment for an appropriation for the purchase of a tractor and attachments, including dump wagon, snow plow, agricultural plow, cultivator, etc.

This request was granted on October 18, 1928, in the sum of $1,392.60, and the equipment was purchased in December.

Also on October 25, 1928, the Board of Estimate and Apportionment approved our request of September 4, for a supplementary appropriation of $850 for necessary repairs to the chimney of our heating plant and the installation of lightning rods. Examination showed that this stack, constructed in 1917, and never repaired since then, had been struck by lightning (possibly more than once) and was otherwise badly in need of repairs.

These supplementary appropriations and the transfers above noted brought the total Tax Budget appropriation for 1928 to the following figures:

| | Final Appropriation | Amount Requested |
|---|---|---|
| Personal Service | $74,699.50 | $ 97,565.50 |
| Other Codes | 18,622.60 | 21,143.60 |
| Totals | $93,322.10 | $118,709.10 |

*Private Funds Accounts*

The private funds budget for 1928 was $102,456.90, as against $116,677.99 for 1927, a decrease of $14,221.09. The difference was due largely to the 1927 contribution of $15,000 for the Rose Garden. The private funds exceeded the Tax Budget appropriation for the second year, the amount being $9,134.80. The percentages for the past four years are as follows, in round numbers:

| | 1925 | 1926 | 1927 | 1928 |
|---|---|---|---|---|
| Tax Budget | 58% | 57% | 43% | 48% |
| Private Funds | 42 | 43 | 57 | 52 |

Of the total of $102,456.90 private funds, $57,249.78 is derived as income from endowment, and $45,207.12 by the uncertain and fluctuating method of contributions annually solicited, membership dues, special gifts, and tuitions and sales.

Attention is also called to the fact that, of the private funds budget, $43,487.75 (42 per cent.) is required to supplement the Tax Budget appropriation for Salaries and Wages, leaving only $58,969.15 for the support and enrichment of our scientific and educational work, including the purchase of plants, books, and equipment, and popular and technical publications, including guide books now sorely needed, and of which we have none. A more generous appropriation in the Tax Budget is now one of our greatest needs.

### *"Salary Injustices"*

This heading is quoted from my preceding annual report. The situation to which attention was called a year ago remains substantially the same now as then, except for the supplementary appropriation of May 3 in the Tax Budget account for Personal Service of $2,162 for the purpose of raising the quite inadequate salaries of 19 positions, all, with two exceptions, on the maintenance force; all receiving before the increases less than $1,800, and none of these positions (with the increase) now exceeding $1,860.

### Appended Reports

I wish to call special attention to the appended reports of the various heads of departments of the Botanic Garden. They contain information too detailed for inclusion in my own report, but quite essential for one who wishes a really adequate picture of the activities of the Garden during the past year. Equally important for the purpose are the Appendices 1–7, followed by a list of the officers and members of the Garden.

All of which is respectfully submitted.

C. Stuart Gager,
*Director.*

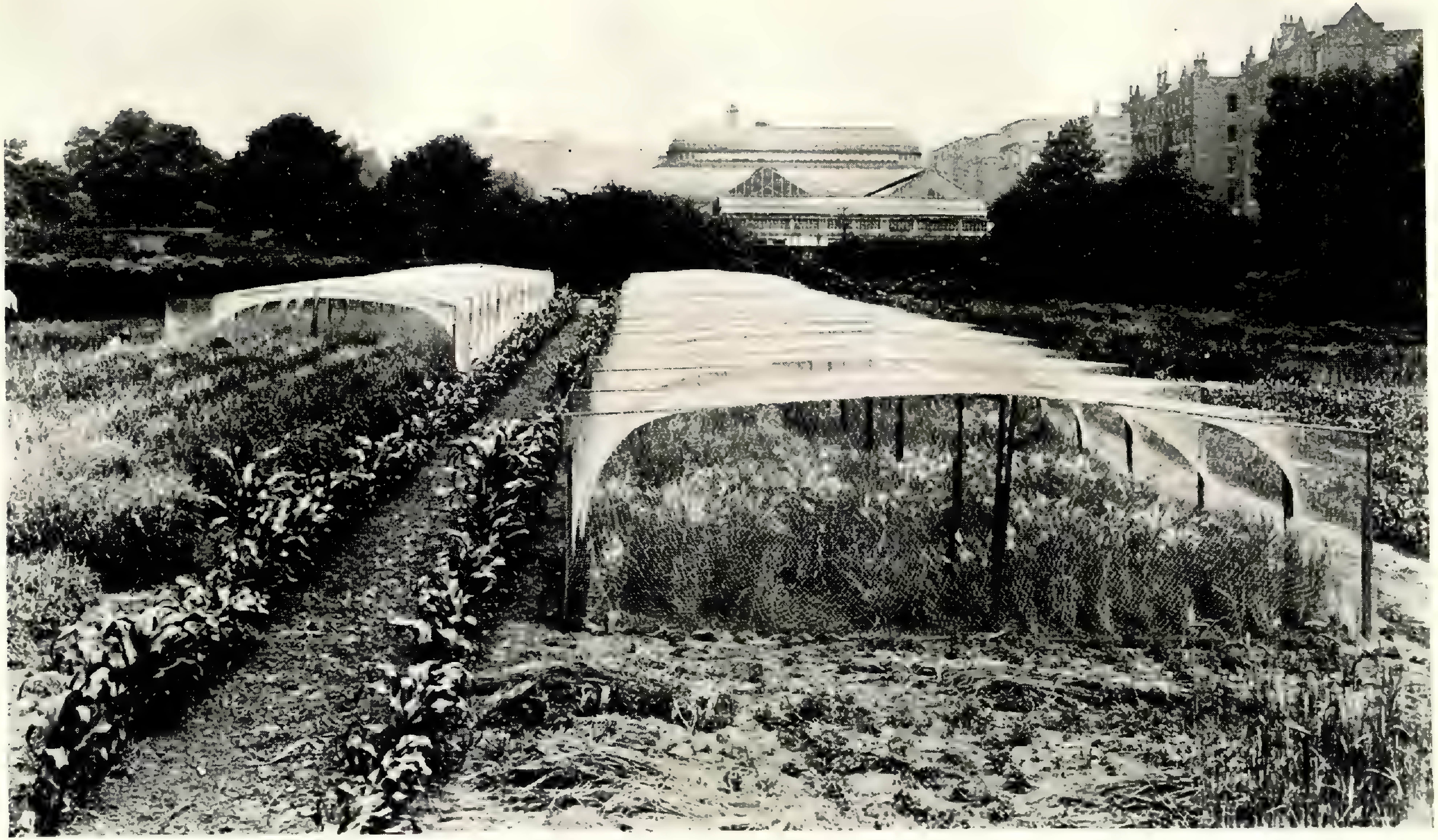

Fig. 6. Experimental Garden, showing netting to protect pedigreed plants from birds. July 19. (6601.)

# REPORTS ON RESEARCH FOR 1928

## Plant Pathology

By George M. Reed

### *Oat smut investigations*

The study of the inheritance of the resistance of oat smut in various oat hybrids has been continued. The very extensive data with loose (*Ustilago avenae*) and covered (*U. levis*) smuts already obtained have been published during the past year. These data included the results with a number of oat hybrids, as Hull-less × Black Mesdag, Silvermine × Black Mesdag, Hull-less × Victor, Early Gothland × Hull-less, Early Gothland × Victor and Monarch × Hull-less. Most of the data published were obtained with the second hybrid generation, in which segregation may be expected. However, the data on the third generation progenies of the hybrids between Hull-less and Black Mesdag were included.

In the hybrids between Hull-less and Black Mesdag, resistance seemed to be the dominant character and segregation occurred in the second generation on the basis of three resistant plants to one susceptible. In the data already published, 465 plants were inoculated with the loose smut and 107 (23 per cent.) were infected; in another series, 196 plants were inoculated with covered smut and 40 (20.4 per cent.) were infected. During the past year additional second generation plants of these hybrids were inoculated. In the series with loose smut 117 plants were inoculated and 23 (19.6 per cent.) became infected, and in the series with the covered smut 178 were inoculated and 38 (21.3 per cent.) were infected. In these experiments also, the Black Mesdag parent proved to be highly resistant, negative results having been obtained with both smuts. On the other hand, the Hull-less parent, as usual, gave high percentage of infection. These data are in harmony with those previously secured.

In my account of the behavior of the third generation of these hybrids, a number of progenies seemed to show a dissimilar behavior toward the loose and covered smut. A total of 578 third generation families were grown, some individuals of each being inoculated with loose smut and other individuals with covered smut. By far the larger number of these gave more or less similar results with the two smuts; a progeny resistant to one smut was resistant to the other, and a progeny susceptible to one was susceptible to the other. There were, however, 47 progenies which gave dissimilar results. In some cases, the progenies showed resistance to one smut, while containing a few individuals susceptible to the other, while in other cases, most of the individuals proved to be susceptible to one, but only a few individuals were susceptible to the other. Additional plants of many of these progenies were grown during the past year in order to determine whether they actually differed in their resistance to the two smuts, or whether the data previously obtained were due to accidental variations in the experiments. In such experiments the number of plants grown is necessarily small. On retesting, practically all of the progenies gave results which indicated that these families were like the others in their inheritance of resistance or susceptibility to both smuts, and that the variations previously recorded were due to environal factors.

Seeds from a number of third generation plants were selected for growing in the fourth hybrid generation. Practically all of these were chosen on the basis of having shown resistance in both the second and third generations. They also possessed various combinations of the morphological characters of the two parents, Hull-less and Black Mesdag. The results indicate quite clearly that the resistance shown in the second and third generations is carried out in the fourth.

The two hybrids between Silvermine and Black Mesdag were continued in the second and third generation; 29 additional second generation plants were inoculated with the loose smut, 8 (27.5 per cent.) being infected; 26 additional plants were inoculated with covered smut and 7 (26.9 per cent.) were infected. Among the third generation progenies the different types of resistant, segregating and susceptible families were secured. Since only a few of these progenies were grown, the data obtained were not in very close harmony with the interpretation that resistance and susceptibility are dependent upon a single factor difference.

However, none of the facts obtained were in any way seriously opposed to this interpretation.

It is a mistake, however, to assume that the inheritance of resistance to both smuts is always the same. It seems to be true that in the hybrids between Hull-less and Black Mesdag the resistance to both smuts is inherited in exactly the same fashion. It certainly does not apply to crosses involving such varieties as Early Gothland × Victor and Monarch × Hull-less. In these hybrids, one parent is susceptible to both smuts, while the other parent is resistant to one, but susceptible to the other. Such crosses serve to indicate quite clearly that the loose and covered smut do not always behave the same in their reaction on different varieties.

As previously noted, the hybrids between Early Gothland and Victor were particularly interesting because both parents were susceptible to the loose smut, while Early Gothland is resistant to the covered smut and Victor is susceptible. The second generation data indicated a segregation in which resistance was dominant and susceptibility recessive to the covered smut, 44 second generation plants being inoculated, of which 8 (18.1 per cent.) were infected. The third generation progenies of many of the surviving second generation plants have been grown and the results obtained were in fair harmony with those secured in the second hybrid generation. A number of fourth generation progenies were also grown, being selected on the basis of their resistance in both the second and third generations. They all proved to be entirely resistant to the covered smut in this generation.

Second generation plants of hybrids between Early Champion and Black Mesdag were also grown. The Early Champion variety is highly susceptible to both loose and covered smut, while Black Mesdag is very resistant. In the second hybrid generation, 278 plants were inoculated with loose smut and 62 (22.3 per cent.) were infected and, in a similar series with the covered smut, 262 plants were inoculated and 51 (19.4 per cent.) were infected. The resistant parent, Black Mesdag, grown in these experiments, showed complete absence of infection, while practically all of the inoculated plants of the Early Champion variety were smutted.

Special interest attaches to the results with the second generation of hybrids between Fulghum and Black Mesdag. The variety Fulghum is extensively grown in the southern United States, and is particularly susceptible to a definite specialized race of *Ustilago avenae*. On the other hand, where the variety has been grown in the southern Spring Oat Section, for example, Kansas and Missouri, it has shown a high degree of resistance to loose smut. The most interesting data on the hybrids between Fulghum and Black Mesdag were obtained with the so-called Fulghum Race of loose smut. The variety Black Mesdag is highly resistant to it, as well as to the other known races of loose smut. In the experiments carried out, a total of 401 second generation plants were inoculated, of which 78 (19.4 per cent.) were infected. The results suggest that resistance is dominant and susceptibility is recessive and segregation occurs on the basis of a three to one ratio. The hybrids are of special interest because of the possibility of securing a Fulghum type of plant, combined with a high degree of resistance to the Fulghum Race of smut. The Black Mesdag parent proved to be completely resistant, while the Fulghum parent gave nearly 100 per cent. infection.

It must be emphasized that in all of these studies, definite known races of both loose and covered smut have been used. In all cases, except with the hybrid Fulghum × Black Mesdag, so-called Missouri Races of both loose and covered smut were used for inoculating the plants. It is just as important to utilize pure specialized races of the parasite as it is pure lines of the host.

One of the hybrids between Hull-less and Black Mesdag has been grown through the sixth and seventh generations. Only a few progenies in the later generations have been grown, and these have been descended from selections which show particular combinations of morphological characters, as well as resistance in the second and third generations. These selections have continued to show, year after year, complete resistance to both loose and covered smut. During the past year, in the later generations, the selections have been tested with all of the races of smut which we now have in culture. In every case they proved completely resistant, running parallel to their resistant parent, Black Mesdag.

### *New races of oat smuts*

Additional experiments were carried on to determine more definitely the characteristics of certain new races of both loose and covered smut. Several different varieties of oats were inoculated with these races and their resistance or susceptibility determined. It is quite clear that both of these smuts are sharply differentiated into distinct races which may be recognized by their reaction on different varieties.

### *Bunt of wheat investigations*

During the past year a large amount of data establishing the existence of races in the two species of bunt, or stinking smut of wheat, was published. Four races of *Tilletia laevis* and six races of *T. tritici* were clearly differentiated by their behavior on varieties of winter wheat. Such varieties as Hussar, Martin, Turkey and Kanred proved to be particularly valuable in differentiating the specialized races. Further tests during the past year were made with these races of bunt and the earlier conclusions substantiated.

Several varieties of spring wheat were also tested with these different races. All the specialized races of *T. laevis* and *T. tritici* already distinguished were used. Most of these races behaved in a more or less similar fashion on all the spring wheats grown. One race, however, already distinguished as *T. tritici,* Race Six, stood out conspicuously with reference to its behavior on the varieties. With this race several varieties, including Garnet, Hope, Kitchener, Ruby, Kota, Marquis and Florence, gave negative results. Only a few varieties gave relatively high percentages of infection, the highest being obtained with Red Sask, namely, 70.8 per cent. infection.

With the remaining nine races, most of the varieties, such as Preston, Early Red Fife, Power, Prelude, Pioneer, Ceres, Garnet, Kitchener Ruby and Kota, gave very high percentages of infection. Occasionally 100 per cent. infection was obtained; in several cases 90 to 99 per cent. of the plants were infected while in a large number of cases the percentage of infection was between 80 and 89 per cent. Only occasionally did the percentage of infection fall below 50 per cent.

The variety Marquis, which has some reputation as being more or less resistant to bunt, gave 33.3 to 62.9 per cent. infection with the four races of *Tilletia laevis* and 51.7 to 89.2 per cent. with the five races of *T. tritici.* The variety Florence, also considered a more or less resistant variety, gave percentages of infection varying from 18.7 to 53.8 with *T. laevis* and 11.7 to 66.6 with *T. tritici.*

It is interesting to note that only one variety—Hope—which has been developed at the North Dakota Agricultural Experiment Station, has proved to be resistant to all of these ten races of bunt.

### *Sorghum smut investigations*

The study on the behavior of various sorghum hybrids to the covered kernel smut was continued. Many of the data were obtained with the second generation and other data with the third generation. The results were in line with those previously secured. A large number of first generation plants of different sorghum hybrids were grown. These crosses were made in 1927 and, for the most part, involved resistant and susceptible parents. During the coming year the second generation plants of these crosses will be grown, and they should prove valuable in the study of the mode of inheritance of covered kernel smut.

## **Forest Pathology**

BY ARTHUR HARMOUNT GRAVES

### *Chestnut Bark Disease Investigations*

Continuing the work on the causes of the greater resistance of the roots of the chestnut as compared with the stems, to the fungus causing the bark disease, a new series of inoculations was made at Hamden, Connecticut, on June 18, 1928. Healthy roots and stems of approximately similar diameters were inoculated with the fungus, in all cases the part of the root inoculated being left exposed to the air. The main purpose of this work was to obtain material for microscopic study, so that if possible it may be determined whether there is any cause, based on the anatomical structure of the root, for its greater resistance. These inoculated parts will be collected, preserved, and studied comparatively, during the ensuing year.

On April 23, 1928, we received from the Office of Forest Pathology, United States Department of Agriculture, fifty-five nuts of the Chinese chestnut, *Castanea mollissima* (F. P. 64), and fifty nuts of the Japanese chestnut, *Castanea japonica* (F. P. 69). A few of each kind were planted by Miss Maud H. Purdy on her farm at Pomona, New York. She now has three one-year-old trees of Japanese chestnut as a result, the rest having failed to germinate. At the Garden, five of the Chinese species and seventeen of the Japanese germinated. On August 2 these were transplanted from the small pots in which they had germinated to the eastern edge of the experimental plot, being set ten feet apart in the row to allow for future growth. Since these species, especially the Chinese, are far more resistant to the blight than the American, the plan is, that when they arrive at the flowering age, cross pollination experiments with the American species be carried on, using particularly those native individuals which are still growing in the region of Greater New York and are, therefore, showing considerable resistance to the blight. On October 15 we received from Mr. Ernest E. Smith, of Brooklyn, six nuts of the American chestnut, which were borne on fruiting basal shoots of diseased trees on his farm at Pomona, New York. These nuts have been stratified and will be planted next spring.

On June 23 and June 25 I inspected exotic chestnuts at Roslyn, Westbury, Jericho, East Norwich, and Oyster Bay, Long Island. Many of these exotic trees have grown from seedling stock distributed by the United States Department of Agriculture to private landowners, beginning as far back as 1915, although a large proportion have died. There are in addition a few scattering trees —mainly the Japanese species—which date back much farther than 1915, and are bearing good crops of nuts each year. Records of the condition, especially as regards disease resistance, of all these trees are being kept by the United States Department of Agriculture against the possibility of their being used in the future as breeding stock. Each year I try to devote a part of my time to making these inspections, but there still remain a large number of records which should be brought up to date.

### *Twig Blight of Oak*

It seems advisable to call attention to the general prevalence of the Oak Twig Blight first described by Miss Ingram (Jour. Agr. Res. 1: 339–346. 1914). So far I have seen it only on chestnut oak (*Quercus montana* Willd.) and each year, within the local flora range, one may find this disease. Miss Ingram, however, records its occurrence on chestnut (*Castanea dentata* Borkh.) and on white oak (*Q. alba* L.), and has proved by inoculations that other species of oak are susceptible. Although in many cases the disease may cause a wilting and browning of the young shoots, it may also kill full-grown leaves indirectly by attacking the twigs that bear them. These leaves then turn a light brown, and on account of the great contrast in color with the healthy green leaves can be seen at some distance. It is a common thing in this region to see chestnut oaks during the summer with patches of these dead leaves here and there over the whole tree. In all cases examined the causal fungus, *Diplodia longispora* C. and Ell., has been found to be present, but it is possible that insect injury may in some instances produce similar symptoms. Usually the damage is slight, but occasionally large trees slowly succumb to continued attacks, and small suppressed individuals in the forest often die from this cause. Further study of the life-history of the fungus, its distribution, hosts and manner of infection is much needed.

It should be stated that all of the work on forest pathology has been done in collaboration with the Office of Forest Pathology, Bureau of Plant Industry, Washington, D. C.

## Beardless Iris Project

By George M. Reed

### *Japanese iris (Iris kaempferi)*

Excellent bloom was obtained on the varieties of Japanese Iris which were well established. The first flowers were observed June 24th, on some unnamed single white seedlings which were growing along the Brook. On June 28th, the first named varieties, Dominator and Pyramid, were in flower, and from that time until early August there was continuous bloom on a large number of varieties. Violet Beauty was in blossom as late as August 14th, Nausicaa, August 20th, and Iphigenie on August 21st.

The varieties obtained from Vilmorin-Andrieux & Cie. in the winter of 1926 were in excellent condition. The plants were strong and sent up several flower stalks with flowers of good size. Extensive notes were taken on these as well as on the other varieties, and comparisons and correct identifications obtained.

In the fall of 1927 a large number of the varieties were divided and transplanted. The plants came through the winter in good condition and most of them produced at least one flowering stalk during the season. However, the height of the flower stalks and the size of the flowers were below normal. In the cases where small established clumps were moved without further division, the plants generally produced several flower stalks with flowers of the usual size. Even plants which were divided to a single rhizome and transplanted in early November came through the winter in good shape and blossomed.

Several valuable additions to the Japanese Iris collection were made. Dr. Harris Kennedy brought to us seventeen unnamed plants from his Japanese Iris garden in Readville, Mass. The Wayside Gardens and the Weller Nurseries Co. sent us varieties from their collections. A very important addition was obtained from Mr. Roy Hart, East Walden, New York, whose plants originally came from Japan, having been obtained from the Sakata Nursery Co. in 1915. Unfortunately, the varieties were not true to their names; however, we spent some time studying his plants and by comparing the original descriptions, were able to correctly identify several of them. His collection proved to be one of the best sources for a wide range of varieties originally introduced from Japan.

The older clumps were divided and transplanted to new beds. A large number of seedlings have been grown, some from known varieties and others from crosses between two varieties. Many of these should bloom during the coming season.

During the past year a good deal of time has been spent in tracing out the early history of the Japanese Iris. More than seven hundred varieties have been given Japanese names. Most of these have come originally from Japan, but a few have been named in Europe or America. In addition to these, there are a large number of other varieties which have been given English names. In some cases these have been grown from seed, while in others they are merely renamed Japanese varieties. A large proportion of the Japanese names have been grossly misspelled, due partly to the Japanese and partly to the English and American nurserymen. An effort has been made to straighten these out and obtain the correct spelling.

The Japanese names applied to Irises are often fanciful or imaginative. They frequently refer to mythological stories or to episodes described in the literature. Some are named for artists, famous warriors, statesmen, and still others for noted places in Japan. An attempt has been made to secure a correct translation for these Japanese names and an explanation as to their significance. In this work Prof. Bunkio Matsuki, of Columbia University, has rendered invaluable service.

### *Siberian and miscellaneous beardless iris*

The varieties of the Siberian group of Irises were in excellent condition. The plants were well established and gave excellent bloom. A few additions to these varieties were also made. We now have about fifty species of beardless Iris. Most of these bloomed satisfactorily during the past season. Many seedlings of species are growing and in a short time will reach the flowering stage. Practically all of the Siberian Irises and the beardless species were transplanted during the past year.

### *Iris diseases*

The Iris plants suffered from various Iris maladies, the most serious losses being among the Japanese varieties. Several plants died during the blooming season or soon thereafter. Various types of disease conditions were observed. During the past year a maggot or larva of the fly, *Chaetopsis fulvifrons,* was found associated with many of the dying plants. Whether it is a primary cause of the condition or not remains to be determined. One of the most important problems in connection with the beardless Iris is that of working out the true story of the various maladies.

Miss Maud H. Purdy was not able to continue her work in making the watercolors of the Iris. We were fortunate, however, in obtaining the services of Miss Louise B. Mansfield, who made several watercolor studies of Japanese varieties, as well as a few of the bearded Iris.

The following table shows the sources of the plants which have been added to the collection:

*Japanese iris*

| | | |
|---|---|---|
| Mrs. Frances E. Cleveland, Eatontown, N. J. | 4 | varieties |
| Mr. Roy Hart, East Walden, N. Y. | 45 | " |
| Dr. Harris Kennedy, Readville, Mass. | 17 | " |
| Mrs. Ella Porter McKinney, Madison, N. J. | 1 | " |
| *R. Wallace & Co., Ltd., England | 19 | " |
| The Wayside Gardens Co., Mentor, Ohio | 9 | " |
| Mr. P. Weller, Weller Nurseries Co., Holland, Mich. | 15 | " |

*Miscellaneous beardless iris—species and varieties*

| | |
|---|---|
| Miss Laura M. Bragg, Director, The Charleston Museum, Charleston, S. C. | 1 |
| Dr. Fred N. Briggs, Berkeley, Cal. | 5 |
| Mr. Frank W. Campbell, Detroit, Mich. | 8 |
| Mrs. Frances E. Cleveland, Eatontown, N. J. | 5 |
| Mr. J. L. Coker, Hartsville, S. C. | 1 |
| Miss Susan T. Homans, Flushing, N. Y. | 6 |
| Miss Susan C. Lovering, Wilmington, N. C. | 1 |
| Mrs. Ella Porter McKinney, Madison, N. J. | 1 |
| Dr. E. B. Mains, Lafayette, Ind. | 2 |
| Mr. Franklin B. Mead, Fort Wayne, Ind. | 3 |
| *Perry's Hardy Plant Farm, England | 26 |
| Miss Isabella Preston, Central Experimental Farm, Ottawa, Canada | 11 |
| Mr. A. O. Snoddy, Cincinnati, Ohio | 1 |
| *R. Wallace & Co., Ltd., England | 7 |
| Mr. Robert Wayman, Bayside, L. I. | 2 |

Financial contributions were received from Mr. William J. Matheson, Mr. H. S. Smith, Mrs. Wheeler H. Peckham, and the American Iris Society.

*Purchased.

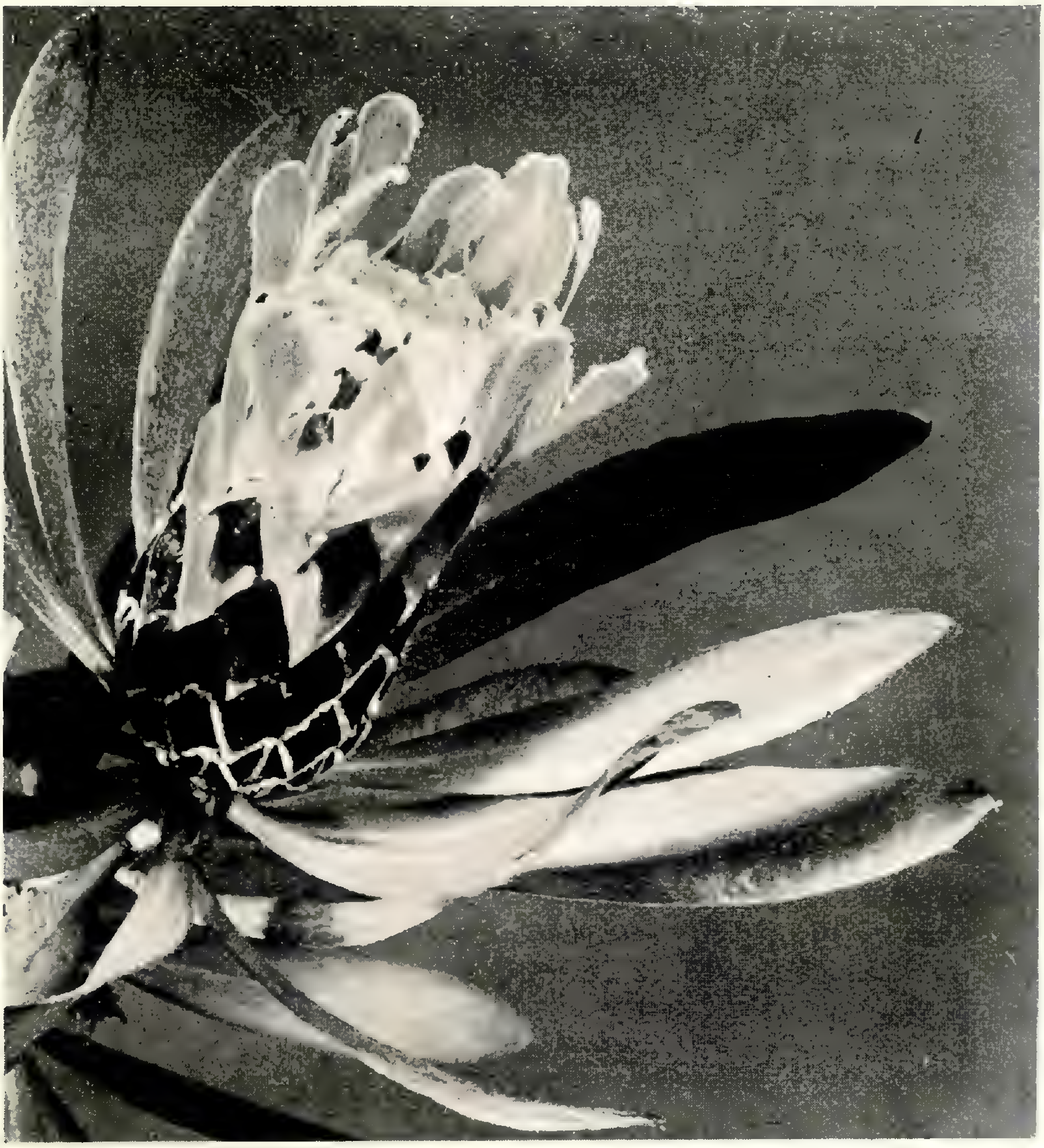

Fig. 7. *Protea obtusifolia.* Inflorescence or flower head, a distinctive feature of the family Proteaceae. The showy parts are bracts, which overlap each other like the scales of a cone, enclosing the flowers proper. February 25. (6451.)

## Systematic Botany

By Alfred Gundersen

### *Frankeniaceae*

During the past year my studies have been confined to the American species of the genus *Frankenia.* The treatment of this genus in Reiche's Flora of Chile is very unsatisfactory. The identity of *F. lignosa* Rusby and *F. peruviana* Schellenberg and their close resemblance to *F. erecta* Gay have been established by my studies. The name, *erecta,* may perhaps be changed: I have not yet followed up the questions of identity of the early names of Molino, Cavanilles, Schauer, and Remy. The resemblance of the Californian *F. grandifolia* var. *campestris* to the Chilean species *F. Berteroana* Gay or *F. micrantha Gay* was first called to my attention by Monsieur Surgis, of Paris; these last have been further studied. I am led to consider the Chilean form only as a variety of the Californian species. I have had great difficulty in obtaining specimens from Argentina. The Argentian species, *F. Fischeri* Hichen, is the most distinct of South American Frankenias.

### *Floral Structures of Dicotyledons*

Studies along these lines were continued. A number of sectional drawings of flowers and flower buds were made by Miss Maud H. Purdy, and several distributional maps were prepared.

## *Studies on the varition of Nephrolepis (Boston Fern, etc.)*

By Ralph C. Benedict

The collections of varieties of the Boston Fern, and of the different *Nephrolepis* species have been maintained as heretofore. In this connection, it may be noted that the recent New York meeting of the American Association for the Advancement of Science afforded an opportunity to show these collections to a considerable number of visiting botanists, and that their interest in seeing these forms as living plants was an indication of the importance of the continued maintenance of as complete a set as possible, not only of the experimental forms on which studies have not been completed, but also of the types of which some report has been made.

The culture of experimental types for which no report has yet been published has also been continued.

A new line of research was started in July, with the employment of Louis Eisman as research assistant for the summer months. Mr. Eisman was started on the problem of the cytological examination of various forms of *Nephrolepis* by means of the Belling staining method. He has completed a preliminary study along this line which gives promise of some very interesting results and for which a report is practically ready.

## *Conservation of Native Plants*

With the publication of a *Leaflet,* " How shall we save rare plant species from extinction," the importance of two fundamental methods of conservation which the Garden has been specially interested in promoting was again stressed: viz., artificial propagation and re-stocking, and plant sanctuaries. Attention was called in the *Leaflets* article to the fact that the establishment of a region containing rare plants as a State Park had sometimes had as an unfortunate result the destruction of the rare plants through grading and path development. In confirmation of this statement, I append a letter from Dr. Homer D. House, State Botanist, relating to a specific example of such destruction in the recently established State Park at Chittenango Falls, N. Y.

## *Letter from the State Botanist*

" Dear Dr. Benedict:

" I have been reading with much interest your remarks in the Brooklyn Botanic Garden *Leaflets* for May 16, 1928.

" I think you have put the case very mildly. The various state park boards have been doing a wonderful work, and like all gigantic undertakings, mistakes here and there are apt to occur. Likewise in their haste to either make certain sites available for recreation, or haste to spend the money available, an occasional irreparable harm is done to some form of wild life which should have been spared and protected. In this category I place the development of paths at Chittenango Falls. This path development was quite an unnecessary thing there. The history of this site and of the one at Green Lake (Clark Reservation) shows them to have been secured and preserved not alone for their scenic beauty but also for the scientific interest attached to the geological formations and to the flora and avifauna. While it was always intended that they should be open to the public, the making of picnic grounds out of the most sacred portions was never contemplated. There are thousands of better sites for picnic grounds in this region than these two, and if the construction of paths or roadways must be undertaken on such small park areas, those responsible might have secured by a mere letter to the former custodians of these properties (The State Museum), complete information regarding the location of the rare plants thereon, and reasons for shunting public recreation activities to other portions of the parks. Failure of the authorities in charge to even know about the chief reasons for these two park areas having been given to the State Museum, seems to be the chief trouble.

" The destruction of the Hart's Tongue fern station east of Jamesville, on the holdings of the Solvay Company, known as Green Pond (east) is greatly to be regretted, but could not be helped. Fortunately those interested in the preservation of the fern moved over 400 plants to the Clark (State) Reservation and elsewhere, believing that there they would be safe. Apparently they are not safe there. Under date of December 15, 1928, Miss M. L. Overacker of Syracuse writes as follows:

" ' Doctor Todd, who has done most of the work of removing and who keeps an eye on them when possible, reports that fully three-quarters have been removed or destroyed in their new refuge.'

" The passing of the Clark Reservation and the Chittenango Falls Park from the Museum into the hands of the Park Board I regard as the worst calamity that has befallen the hopes of preserving the last of the Hart's Tongue fern in this country. The construction of the path down the cliff at Chittenango Falls is the finishing touch.

" I observed personally during the latter part of 1926 the construction of this path. In one day I saw at least a dozen buried in the debris of the angle of this path. I also saw people remove and carry away plants of the Hart's Tongue fern. I should be more exact and say that it was also Hart's Tongue ferns I saw destroyed by the construction of the path.

" There is an implied question in the title of your article: '*How shall we save rare plant species from extinction?*' You really haven't answered the question, and I do not know by whom nor how it will ever be answered, but you certainly have indicated how they cannot be saved. Parks and recreation grounds are certainly a wonderful thing, and the development of this idea in recent years has been remarkable, but as far as the preservation of rare and harmless forms of wild life is concerned, they certainly have made a poor start in this State.

" Sincerely yours,

(Signed) " HOMER D. HOUSE."

# REPORT OF THE CURATOR OF PLANTS FOR 1928

Dr. C. Stuart Gager, Director.

*Sir*: I beg to submit herewith my report for the year 1928.

## Collections

Among plants received were 60 specimens of rock garden plants from Oregon, and about 40 specimens of Central American orchids from the Missouri Botanical Garden. A number of additional conifers were planted, and about 20 additional varieties of flowering crabapples and cherries.

During the spring, in collaboration with the horticulturist, twenty-six detailed maps were made of the rock garden, showing the location of each species.

In the fall, the Cycad house was rearranged, removing other plants, and separating old world and American genera. We have seven of the nine genera, lacking only *Stangeria* and *Microcycas.*

## Phanerogamic Herbarium

Among collections received were the following: 159 plants from British Columbia, collected by Mr. Titus Ulke; 101 plants from the Catskills, collected by Mr. Norman Taylor; and 185 specimens collected by E. J. Ersler in Norway.

Additional specimens were collected by me in the Catskill Mountains, and about 100 specimens were sent to each of four herbaria, namely: The Torrey Botanical Club, and the botanic gardens of Zurich, Melbourne, and Cluj, Roumania. The last three were in exchange for specimens earlier received by us.

Some new metal cases for the herbarium work-room made it possible to begin an arrangement of collections there.

## Cryptogamic Herbarium

Dr. Reed, curator of plant pathology and in charge of the Fungus Herbarium, reports the following accessions for 1928:

| | |
|---|---|
| By Purchase | 154 |
| By Exchange | 74 |
| Total | 228 |

## International Seed Exchange

*Communication No. 9* was published in April, containing replies to our questions as to the desirability of an international list of genera, its duration, and suggestions as to ten institutions to advise as to a possible preliminary list. Twenty-seven replies were received, nearly all expressing the need of greater uniformity in nomenclature, but some calling attention to difficulties in the way. The institutions named the greatest number of times were: Berlin 27, Kew 26, Paris 25, Geneva 16, Copenhagen, Vienna and Zurich each 14 times, Tokyo 13, Leningrad 12, Arnold Arboretum and Stockholm, each 10 times. The actual making of a list indicating differences in present usage is progressing.

## Research

Studies of Frankenias and of the structures of flowers were continued. I spent some days in the National Herbarium in Washington and later obtained the loan of specimens from Washington, from the Field Museum, and from the Missouri Botanical Garden. In December I presented a paper on " South American Frankenias " before the Botanical Society of America.

During the winter Mr. Ezekiel Rivnay, a graduate student of New York University, came two afternoons weekly for about three months. He made a comparative study of flower and leaf morphology of the Aizoaceae and Cactaceae, presenting a thesis with excellent drawings for his A.M. degree.

Miss Mary MacMurray, of Hunter College, came every Saturday forenoon to make a systematic study of opposite leaved shrubs.

## Lectures and Classes

During March I gave three lectures at the Garden on " The Story of the Flowering Plants."

The same month the " Evolution Exhibit " was revised and set up in the Garden Exhibit at the International Flower Show.

During May and June I gave eight field lessons on " Spring Flowers and Ferns "; during October and November four outdoor lessons on " Fall Flowers and Fruits."

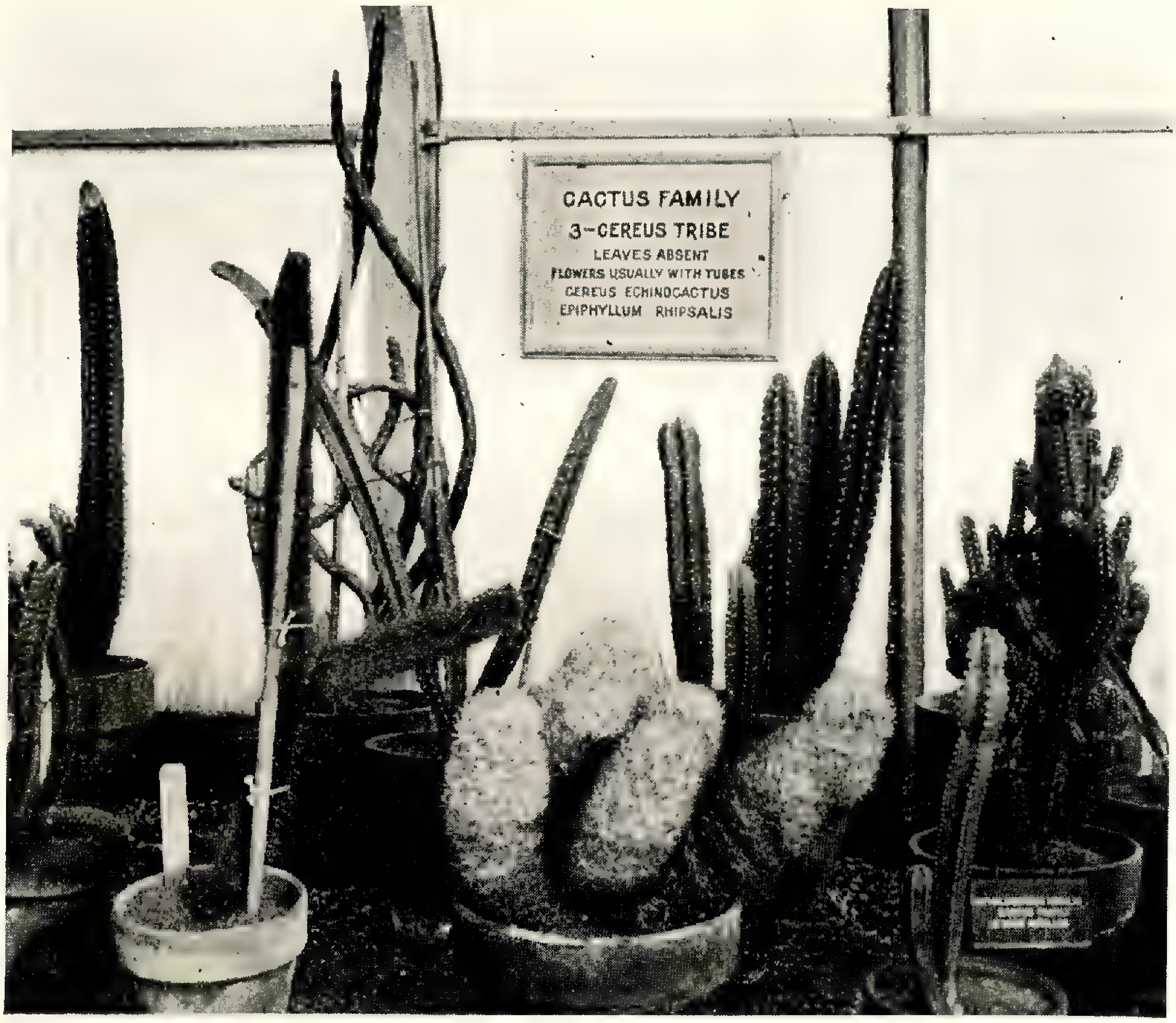

Fig. 8. Label on ground glass in the Conservatory. One of several of this type recently installed. December 5. (6622.)

## Assistance

Miss Maud Purdy, became curatorial assistant on January 1, and has been occupied with drawing and microscopic work, including embedding, principally of Frankenias. She also made a number of detailed sectional studies of flowers.

Miss Alexandra Dodd, curatorial assistant, resigned November 1, 1928. Miss Belle Burr, a graduate of Wellesley College, came as curatorial assistant in September, 1928.

## Labels and Signs

Labels and signs were made by our labeler, Mr. John McCallum, as follows:

| | |
|---|---|
| Steel labels for herbaceous and rose beds | 506 |
| Lead labels for woody plants | 32 |
| Small wooden labels, including roses | 341 |
| Large wooden labels for horticultural forms | 15 |
| Wooden signs | 49 |
| Cardboard signs | 120 |
| Total | 1,063 |

Also numerous miscellaneous numbers and signs.

## Statistics

*Living Plants received:*

| | Plants | Species or Varieties |
|---|---|---|
| By exchange | 179 | 104 |
| By gift | 2,760 | 2,682 |
| By purchase | 7,460 | 327 |
| Derived from seed | 105 | 105 |
| By collection | 83 | 33 |
| Total | 10,587 | 3,251 |

| | |
|---|---|
| *Living Plants Distributed:* | |
| By exchange | 000 |
| *Seed packets received:* | |
| By exchange | 1,041 |
| By purchase | 130 |
| By gift | 17 |
| By collection | 110 |
| Total | 1,298 |
| *Seed packets distributed:* | |
| By exchange | 2,015 |
| *Herbarium specimens received:* | |
| By exchange | 799 |
| By collection | 328 |
| By gift | 371 |
| By purchase | 159 |
| Total | 1,599 |
| *Herbarium specimens distributed:* | |
| By exchange | 372 |

Respectfully submitted,

ALFRED GUNDERSEN,
*Curator of Plants.*

# REPORT OF THE HORTICULTURIST AND HEAD GARDENER FOR 1928

Dr. C. Stuart Gager, Director.

*Sir:* I beg to submit herewith my report for the year ending December 31, 1928.

## General Systematic Section

In the fall changes, based upon a plan made by Mr. Caparn, were made in the layout of the area devoted to the Pea Family (Papilionaceae), with a view to utilising to better effect the ornamental members of the family. This involved the elimination of two beds containing herbaceous species, and the construction of a new bed, immediately south of the hedge of Scotch Broom, and planted with the more ornamental varieties removed from the discontinued beds. The southernmost limit of the family on the west side of the walk was bordered with an informal hedge of various species of *Lespedeza* (Bushclover). To mark the south edge of the family on the east side of the walk, provision was made for a planting of *Robinia hispida* (Rose-acacia), to be set out in the spring of 1929.

The area assigned to the Rutaceae was extended northward, and holes were prepared for planting in the spring of 1929. This will provide additional space that is much needed in this family.

The Grass Family (Gramineae) was rearranged and separate beds provided for each species and variety. It is hoped that this arrangement will display the grasses to better advantage and prevent the mixing of species that is likely to occur when many kinds are grown in one bed.

Our climbing species of the genus *Lonicera,* up to this year, have had no supports on which to grow. This was remedied in the late summer by the erection of seven tripods constructed of cedar poles over which these Honeysuckles may clamber.

## Ornamental Planting

Thirty-two trees of the Chinese Flowering Crab, *Malus spectabilis,* seven of the Sargent Crab, *M. Sargentii,* and five of the

Midget Crab, *M. micromalus,* were planted on the embankment immediately north of the Japanese Garden.

Many duplicate trees and shrubs from our own nursery were set out on the Museum embankment north of the esplanade.

The Narcissus plantings in the grass on Boulder Hill were extended by the addition of 3,000 bulbs of the variety "Sir Watkin," and 1,000 of the variety "Lucifer."

Two thousand tubers of the Winter-aconite, *Eranthis hiemalis,* were planted on both sides of the brook, immediately south of the lower boulder bridge.

Three beds in the Compositae area, formerly occupied by hardy asters, were planted with hardy chrysanthemums raised from seeds planted in the greenhouse in February. These beds made a fine display and created much interest, as did an adjacent bed of named varieties.

Planting of vines, shrubs, and trees about the new Hills' bridge was carried out in the fall according to a plan prepared by Mr. Caparn.

## Rose Garden

Of the work still remaining to be done to complete the Rose Garden, as set forth in my last annual report, the following has been accomplished:

1. Floor of Pavilion and approaches paved with red brick (By John Thatcher & Son).
2. Two flights of concrete steps and curbing made at north and south entrances to Pavilion.
3. Erection of ten double arches over walks.
4. Walks graded and surfaced with blue stone screenings.
5. Two beds made in south triangle and terrace finished.
6. Over 2,250 roses (about 180 of which were replacements), and about 100 rhododendrons, vines, and miscellaneous shrubs planted.
7. Gates for the east, west, and south entrances were erected by outside labor.

Important needs for the Rose Garden are:

1. Lattice frames for the north side of the north pergola.
2. Metal edgings between lawn and walks.

3. Thirty concrete posts with connecting chains for festoon roses.

The growth made by the roses surpassed our expectations and there was a fair display of rose blooms on the Tea and Hybrid Tea varieties as late as the end of November. Some of the climbing roses have made canes sixteen feet or more in length and practically all of them have made vigorous growth.

It may be desirable to record that it seemed necessary, in the attempt to control " Black Spot " and leaf-eating insects, to dust the roses with a sulphur-arsenate of lead preparation thirty-six times throughout the growing season. This averages about once in every five days. The control of aphides necessitated fifteen sprayings with contact insecticides.

## North Addition

The soil in this area (between Mt. Prospect Reservoir and the Museum Building) of about four acres is gradually improving. A dressing of stable manure, and green manure crops of rye, hairy vetch, and buckwheat, were plowed under during 1928. A crop of rye was planted in the fall for turning under in the spring of 1929.

## Miscellaneous

Trenches for water and sewer connections for a bubbler drinking fountain were dug, a concrete base cast, and the pedestal set up in readiness for the plumber.

About 700 square feet of tar macadam was laid over the Hills' bridge and its approaches.

A start was made on levelling depressions in the lawns caused by subsidence of the soil in places formerly occupied by trees and shrubs. This is a fairly large undertaking, but should be carried out on the score of improving the appearance of the lawns and of facilitating mowing.

## Seed and Plant Distribution

In connection with the International Seed Exchange, 2,015 packets of seeds of trees and shrubs were distributed to foreign and domestic botanic gardens, and to other institutions and individuals in the spring of 1928.

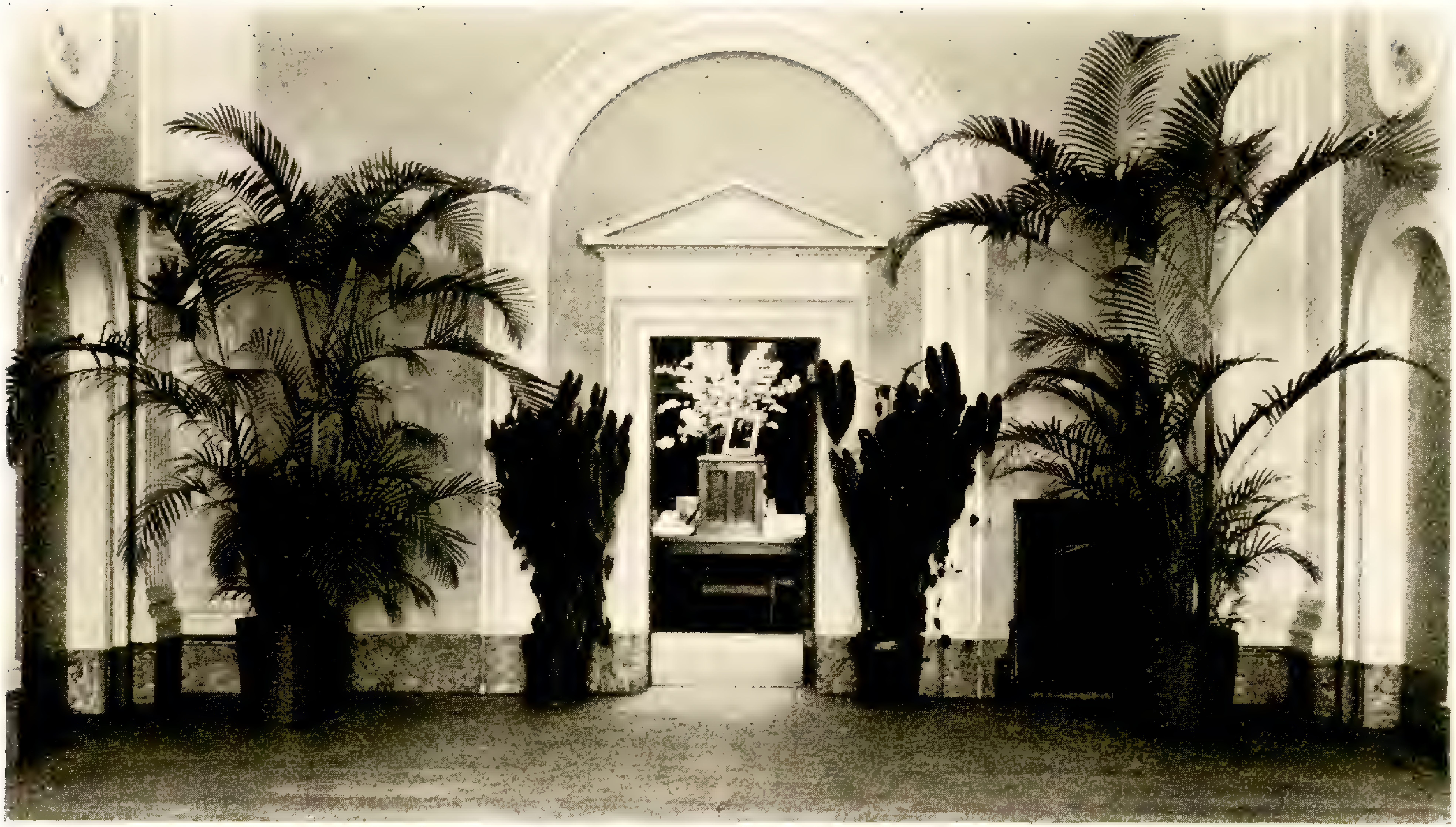

FIG. 9. Portion of rotunda of the Laboratory Building, showing use of Areca palms (*Chrysalidocarpus lutescens*) and of *Philodendron andreanum*. Spray of flowering crab in the Library. May 8. (6473.)

Seven hundred and sixty-eight plants of chrysanthemum, canna, and hardy aster were distributed to Botanic Garden members.

### Personal Activities

In February I was appointed a Local Secretary of the American Rose Society for 1928.

I am also serving on the Plant Registration Committee of the National Association of Gardeners.

Respectfully submitted,
MONTAGUE FREE,
*Horticulturist and Head Gardener.*

## REPORT OF THE CURATOR OF PUBLIC INSTRUCTION FOR 1928

DR. C. STUART GAGER, DIRECTOR.

*Sir:* I beg to submit herewith my report for the year ending December 31, 1928.

### Garden Attendance

*Registration at Entrance Gates.* As shown by Table I, the total attendance on the grounds in 1928 was 1,101,653. Thus the remarkable gain recorded for 1927 when the registration figures reached 1,013,293, or more than twice the figure for 1925, was not only held, but increased by about 10 per cent.

*Attendance at Classes and Lectures.* There has been a very large increase during the past year in attendance at classes and lectures for children and adults. The comparative figures for the last three years are as follows:

| | |
|---|---|
| Year 1926 | 87,766* |
| " 1927 | 97,884 |
| " 1928 | 151,631 |

This great increase has been made possible, in part, by the addition of new instructors to the staff of the department of elementary instruction.

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* A figure for the year 1926 was given in last year's report (*Brooklyn Bot. Gard. Rec.* 17:63), erroneously, as of 1927.

*Attendance at Conservatories.* The increase of visitors to the conservatories is also noteworthy. The figures for the three years past are as follows:

| | |
|---|---|
| Year 1926 | 27,169 |
| " 1927 | 34,563 |
| " 1928 | 44,296 |

This increase seems to indicate a greater interest in plants *per se,* and falls into line with an evident growing tendency on the part of the public to use the Botanic Garden more as a museum of living plants than a pleasant open space for physical recreation. The increase is probably also due in part to the greater attractiveness of the conservatories. In addition to their being enriched from year to year and receiving the benefits of continual care, they are profiting by the passage of time, an element which is of course indispensable to the full development of any collection of plants.

TABLE I

ATTENDANCE AT GARDEN DURING 1928

| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Annual Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| At regular classes | 802 | 2,088 | 2,464 | 2,837 | 3,528 | 2,905 | 10,995 | 10,745 | 7,708 | 8,388 | 3,765 | 2,959 | 59,184 |
| At visiting classes | 1,220 | 800 | 7,474 | 8,375 | 10,345 | 10,115 | 280 | — | 2,740 | 6,995 | 4,157 | 2,248 | 54,749 |
| At lectures to Children | 915 | 640 | 2,074 | 4,177 | 8,238 | 8,115 | 200 | — | 1,670 | 5,670 | 3,076 | 1,250 | 36,025 |
| At lectures to Adults | — | 80 | 70 | 175 | 185 | 992 | — | — | 4 | 107 | 60 | — | 1,673 |
| At conservatories | 1,236 | 2,678 | 1,385 | 5,921 | 8,762 | 2,613 | 3,997 | 1,806 | 4,938 | 5,652 | 3,049 | 2,259 | 44,295 |
| At grounds | 48,309 | 54,764 | 54,904 | 112,880 | 170,504 | 139,319 | 101,368 | 93,630 | 102,578 | 98,017 | 67,842 | 57,538 | 1,101,653 |

## Study Material for Schools

As usual, the major part of the time of my assistant, Miss Hester M. Rusk, has been occupied with the collection, culture, and preparation of materials for use in the study of botany and biology in the schools. During the past year, study material has been furnished for 156,619 pupils, compared with 109,011 in 1927, and 91,300 in 1926. In this work we have as usual had the cooperation of the Department of Elementary Instruction. 25 high schools and annexes in Brooklyn have been supplied, 8 in Queens, 19 in Manhattan, and 10 in the other boroughs. 18 junior high schools, 4 training schools for teachers, and 11 colleges and universities, as well as 110 elementary schools in Brooklyn and 38 in other boroughs have been assisted in this way. There should be added to this list 25 private and parochial schools. The increasing demand for our agar medium, which is used for the study of molds and bacteria, is attested by the fact that during 1928 Miss Rusk prepared 3,231 petri dishes and 24 flasks of agar—an average of more than 300 a month for each of ten school months of the year. The number of petri dishes distributed compares with previous years as follows:

| | |
|---|---|
| Year 1926 | 1,667 |
| “ 1927 | 2,338 |
| “ 1928 | 3 231 |

Besides carrying on this work Miss Rusk has assisted in docentry, in editorial work, in the preparation of demonstrations for adult classes, and has conducted the Saturday morning laboratory classes as well as occasional field classes.

### Class for Student Nurses

For ten weeks in the spring, beginning April 4, I gave an elementary course in botany to the student nurses of Prospect Heights Hospital, Miss Mary E. Corcoran, Instructor. In the fall it was arranged to join the student nurses of the Swedish Hospital, Rogers Avenue, Brooklyn, with those of the Prospect Heights Hospital into one class—making 21 students in all. The purpose of this course was to combine, as far as possible, instruction on plant life, including especially drug plants and the care of flowers, with recreational features such as trips through the Garden to see the different plants in flower, and visits to the conservatories. This novel course in botany for student nurses was described in the *American Journal of Nursing* for May, 1928. A letter from Dr. E. A. Baber, of Longview Hospital, Cincinnati, Ohio, asked us for an outline of the course and details as to just how it was carried on.

In December the student nurses of the Prospect Heights Hospital carried on bacteriological laboratory work here under the direction of Miss Rusk, who was formerly the instructor in bacteriology at Barnard College. At the first exercise on December 14, they made up the medium and sterilized it. Then the petri dishes were sterilized and the medium poured into them. These dishes were exposed in the laboratory, in the class room in the hospital on Washington Avenue, in a movie theater, and in the subway. In other dishes, heels, cuffs, teeth, finger nails, hair, chewed pencil, and money were inserted. The colonies resulting were examined macro- and microscopically on December 19, and notes were taken on the comparative number of colonies and their appearances. Also, on December 19, dilution cultures of milk were made, using three kinds: certified or raw milk, grade "B," and loose milk, to ascertain their relative content of bacteria. On December 29 they examined these dilution cultures. The results were quite in line with what is to be expected in these three grades of milk. The certified grade was found to contain 21,300 bacteria per c.c., grade "B," which is, of course, pasteurized, 14,500; and the "loose" milk, 5,200,000 bacteria per c.c.

*Drug Garden.* In this conection it seems pertinent to suggest that a collection of growing plants which are used medicinally for the various ills of the human race would be a desirable addition to the Botanic Garden, not only as a matter of scientific interest, but also as a means for enlarging the scope of such a course as is above described. Drugs which the nurses ordinarily see only in powdered or tinctured form take on an entirely new aspect when it is realized that they are parts of living, growing plants.

We received in the fall, from Columbia University, College of Pharmacy, through Mr. Victor A. Lewitus, Instructor, 215 samples of different plant drugs which are described in the United States Pharmacopeia. It would be a desirable thing to have these put up in containers of uniform size, properly labelled, and arranged in a cabinet for exhibition and study.

### Advanced Courses

Mr. Ezekiel Rivnay, of the Massachusetts Agricultural College, was engaged in research during May and June under the immediate direction of Dr. Gundersen. The subject of his work was " A Comparison of Aizoaceae and Cactaceae," which was accepted by New York University in part fulfillment of the requirement for the degree of A.M. Miss Mary T. MacMurray also spent several months working in the herbarium under Dr. Gundersen's guidance. Mr. Louis Eisman, working under Dr. Benedict since July 1, has carried on cytological work on the group of the ferns.

### Personal Class Work

Besides the special classes for student nurses just mentioned, which were conducted both in the spring and fall, I have taught the regular classes on the Trees and Shrubs of Greater New York, meeting on eighteen Saturday afternoons in the spring and fall. Thirty-eight registered for this course in the spring and twenty-eight in the fall. In addition, the regular course in General Botany for teachers has been held each Thursday afternoon through the school year. During March, April, and May, I gave five lectures on the classification of the plant kingdom to the class in advanced biology of the Maxwell Training School for Teachers. A similar course of three lectures was given for the class in biology of the College of the City of New York, Brooklyn Division. In October, November, and December, nine lectures on the classification of the plant kingdom were given to the new class in advanced biology of the Maxwell Training School for Teachers.

### Conference of Museum Staffs

On Friday, May 4, a conference of educational staffs of museums, botanic gardens, etc., of the metropolitan area was held at the Garden, beginning at 10:30 a.m. Dr. Gager presided, opening the conference with remarks on the work of the Garden. Miss Shaw spoke on " Some Phases of Educational Work with Children at the Brooklyn Botanic Garden," and Miss Anna B. Gallup, of the Children's Museum, read a paper on " Informal Docentry." Several topics were then submitted for round table discussion. After luncheon, which was served in the Rotunda, a tour of inspection of the Laboratory Building, Grounds, and Conservatories, was made, in which the educational features were pointed out. Fifty-three persons attended the conference, representing, besides the Brooklyn Botanic Garden, the following institutions:

American Museum of Natural History
Brooklyn Museum
Children's Museum
Metropolitan Museum of Art
Montclair Art Museum
Museum of the City of New York
New York Botanical Garden
New York Historical Society
Newark Museum
Staten Island Institute of Arts and Sciences
Yonkers Museum of Arts and Sciences

### Newspaper Publicity

Because other duties have made increasing demands on my time I have been unable to give this part of my work as much attention as formerly. During the year I prepared 17 news releases of activities at the Garden, containing 51 articles on various subjects. Nevertheless, with the assistance of Mrs. Louise Warner, of the Brooklyn Publicity Bureau, the newspaper publicity we received far exceeded that of 1927, if this can be measured by the number of items we received through clipping bureaus. Last year we received 1,117 clippings, as against 677 in 1927, and 513 in 1926. Judged by these figures, we have more than doubled the newspaper publicity of 1926.

But there is another point brought out by the clippings received this year, namely, that the publicity has taken on more of a national character. Whereas, in 1927, clippings were received from 32 newspapers, published in 23 towns and cities, distributed in nine states and the District of Columbia; in 1928, items telling about the work of the Brooklyn Botanic Garden were received from 133 newspapers, published in 120 different towns and cities, distributed in 30 states and the District of Columbia. This is exclusive of those located in Greater New York, these last numbering 30, as against 26 last year.

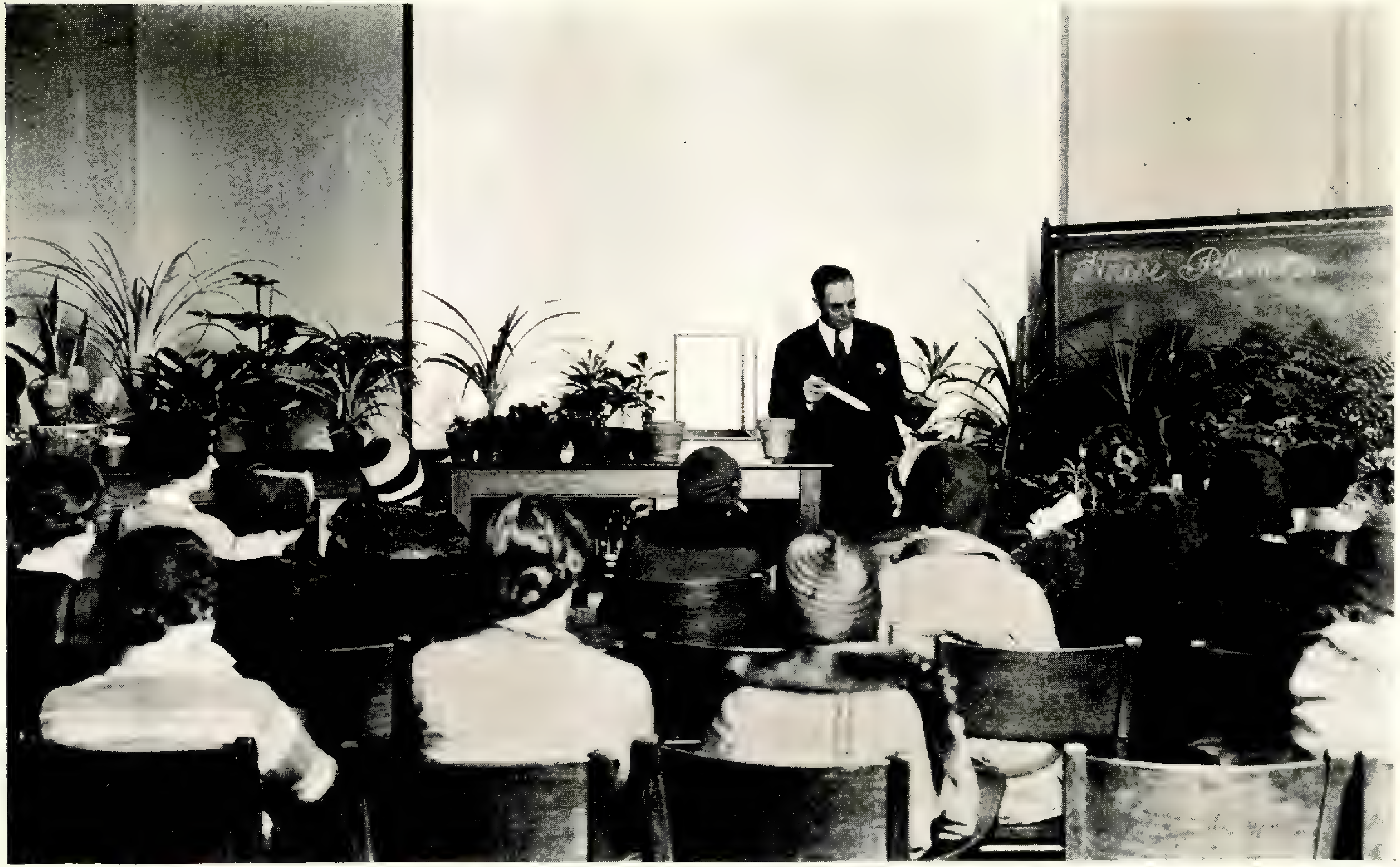

Fig. 10. Class of adults in "House Plants." November 8. (6630.)

## Exhibitions

The Brooklyn Botanic Garden exhibition at the Seventh Annual Exposition of Women's Arts and Industries, at the Hotel Astor, for the week beginning October 1, was in charge of the Department of Elementary Instruction. Two other exhibitions, featuring the educational work of the Garden, were staged during the year by this Department, in cooperation with the Department of Elementary Instruction. The exhibit at the International Flower Show, March 19, 1924, at the Grand Central Palace, Manhattan, had as its central feature the evolutionary "tree" of the plant kingdom, arranged much as it now appears in House Number 2 of the Conservatories. A special *Leaflet,* "The story of plant evolution," was prepared by Dr. Gundersen in connection with the exhibit of the evolutionary "tree," and distributed to visitors. Specimens of plants and plant materials which the Garden distributes to schools were also exhibited, as well as samples of petri dishes filled with agar. A display of petri dishes which had been exposed in various places by Haaren High School pupils of Dr. R. C. Benedict attracted much attention, and a special *Leaflet,* prepared by Dr. Benedict, entitled "How bacteria are studied in high school science classes," was distributed. In order that the work of the Garden on the conservation of our native plants might be represented, several plants were exhibited of the Hart's Tongue Fern, a rare species which the Garden is propagating for distribution in suitable localities. Dr. Benedict wrote a *Leaflet,* "How shall we save rare plant species from extinction?", which was given out to those interested. The background of the exhibit was occupied by the flower panels from the Children's Room, depicting the seasonal procession of the flowers, a map of the world showing the various points of the globe to which the Garden publications are sent, and various photographic enlargements of juvenile and adult classes at the Garden. A model of the Children's House and Gardens occupied one end of the booth, and a Wardian case containing growing plants, and also seedlings and cuttings raised by the Children's classes, were displayed at the opposite end. *Leaflets* on the children's classes, the flower panels, the children's garden, and the Wardian case were distributed.

An electrically operated machine (the Davis Bulletin) showing in succession various colored illuminated views and information concerning the Botanic Garden attracted much attention.

The Garden's exhibition at the United Parents Association Exposition, Grand Central Palace, April 23–28, was similar, except that the booth was smaller: the central table with the evolutionary tree of the plant kingdom was therefore omitted.

At all these expositions attendants from the staff of the Garden were continuously on duty explaining details to visitors. It is impossible to more than guess the number of visitors who saw the exhibits. The expositions were all well attended, so that probably the number of visitors exceeded 100,000.

## Leaflets

As in former years, I have continued the editorship of the *Leaflets*. Six issues, four of them double numbers, were published during 1928. The first three, No. 1, "The story of plant evolution"; No. 2–3, "How bacteria are studied in high school science classes"; and No. 4, "How shall we save rare plant species from extinction," were printed in advance of the date of issue, for distribution at the two expositions as above stated. No. 5–7, "Department of Elementary Instruction: A survey of work from 1913 to 1928," was printed in advance of the date of issue, for distribution at the Spring Inspection, May 8. No. 8–9, "Bulb culture," was a third printing of this popular subject, and No. 10–11, "Practical suggestions on the growing of Christmas greens," was written in response to queries elicited by the Christmas *Leaflet*, last year—"What price Christmas greens?" To date (Jan. 31, 1929) ninety persons, mostly residents of Long Island, have written to the Garden for copies of the leaflet on the growing of Christmas greens.

*Reprints.* Ten years ago from 1,200 to 1,500 copies comprised a single issue of the *Leaflets*. Today 3,000 copies per issue are needed, primarily because of the increased membership in the Garden and the much longer list of exchanges; and also because of the greater demands of the schools for copies for distribution. Even with 3000 copies, popular issues soon become exhausted. "House plants," for example, has been through three printings:

1915, 1921, and 1926, and is now again "out of print." Of the 176 pages issued in the last four years 64 or over one third have various persons for the reprinting of nine other leaflets, with a been reprinted matter. We have on hand now requests from total pagination of 76 pages. It is suggested that in the future a larger sum in the budget be set aside for the *Leaflets* printing so that these old numbers which are now exhausted could be reprinted in addition to the regular annual series.

*Distribution of Leaflets to Rural Schools.*—In the September 1928, issue of *The Science Classroom* there appeared an article entitled "Commercial Material for Science Classes." In this article, 131 firms and institutions were listed who would supply *gratis* on request material of service in science teaching, such as charts, exhibits, or printed material. Through a misunderstanding the name of the Brooklyn Botanic Garden appeared in this list. As a result we were almost swamped with requests for material of all kinds, mostly by isolated rural schools, from practically all over the United States. Nevertheless, we responded to these requests in every case, by sending a selected set of our *Leaflets* which would be helpful in biology teaching. The subjoined list of 68 schools which applied, representing 28 states and one Canadian Province, gives an idea of the kind of school and the country-wide demand for this material.

- Arkansas:
  - *Tyronyza*
- British Columbia:
  - Vancouver: *Templeton Junior High School*
- California:
  - Los Angeles:
    - Tranquillity: *Tranquillity Union High School*
- Connecticut:
  - Wethersfield:
- Georgia:
  - Nahunta: *Nahunta High School*
- Idaho:
  - Cottonwood: *St. Gertrude's Convent*
- Illinois:

Chicago: *Our Lady of Sorrows School*
Tuscola: *Tuscola Community High School*
Indiana:
La Fontaine: *Banquo High School*
Iowa:
Clarence:
Colwell: *Colwell Consolidated Schools*
Marshalltown:
Richland:
Kansas:
Phillipsburg:
Stockton: *The Stockton Public Schools*
Tipton: *Tipton High School*
Louisiana:
Haynesville:
Maine:
Amite:
Dover-Foxcroft: *Foxcroft Academy*
Eastport:
Massachusetts:
Dorchester: *Grover Cleveland School*
Saugus: *Saugus High School*
Jamaica Plain: *Jamaica Plain High School*
Michigan:
Detroit: *Munger Intermediate School*
Kalamazoo: *Kalamazoo High School*
Wabasha: *St. Felix High School*
Minnesota:
Benson: *Benson Public Schools*
Duluth: *Arnold School*
Lake City: *Lake City Public Schools*
LeRoy: *Rural schools*
Mankato:
Motley: *Motley Public Schools*
Minneapolis: *Community Welfare Association*
St. Paul: *Harding High School*
Montana:
Malta: *Malta Public Schools*

Nebraska:
  Lynch: *Lynch Public School*
New Jersey:
  Newark: *State Normal School*
New York:
  Bedford Hills: *Bedford Hills High School*
  Brooklyn: *St. Benedict Joseph's School, Morris Park*
  Kenmore: *Kenmore Junior High School*
  Oneonta:
  Rockaway Beach:
  Silver Creek:
North Carolina:
  Connelly Springs:
  Kenansville: *Consolidated Schools*
North Dakota:
  Willow City: *High School*
Ohio:
  Cleveland: *Immaculate Heart of Mary School*
  Hubbard: *Hubbard High School*
  Quaker City:
  Leavittsburg:
  Wright City:
  Zanesfield:
Pennsylvania:
  Aliquippa:
  Artistes: *Conyngham Twp. High School*
  Homer City:
  Johnstown: *Central Catholic High School*
  Lansford:
  Reading: *Ferndale Nature Study Club*
South Dakota:
  Howard: *Howard Public Schools*
Texas:
  Eagle Lake: *Eagle Lake High School*
Vermont:
  Johnson: *Normal Training Course*
Washington:
  Tacoma: *Lincoln High School*

West Virginia:
  Ceredo: *Ceredo-Kenova High School*
  Morgantown:
  Pratt:
Wisconsin:
  Milwaukee: *Peckham Junior High School*
  Wisconsin Rapids:

### Editorial Work, etc.

Besides editing the *Leaflets,* I have continued to serve on the board of editors of the *American Journal of Botany,* and also as editor of the plant section of General Biology of *Biological Abstracts.* I have been appointed editor of the *Brooklyn Botanic Garden Contributions.* I have resigned as Secretary of the Torrey Botanical Club, having served five years in this capacity. The resignation will take effect on January 8, 1929.

### Other Activities

On September 17, I attended the meeting of Bartlett Associates and Guests, at the Bartlett Research Laboratories of the F. A. Bartlett Tree Expert Company, near Stamford, Connecticut. On October 4 and 5, I attended the Fifteenth Recreation Congress conducted under the auspices of The Playground and Recreation Association of America, at Atlantic City, N. J. At this convention I acted as summarizer of the discussion of the topic " The Place of City Forests, Botanical Gardens, Zoological Gardens, Museums, and Other Special Aids to Recreation."

### Miscellaneous

*Flower Days for Members.* During 1928 we continued the plan of instituting flower days for members, begun in 1927. The following " Days " were observed:

June 1, Iris Day, held in conjunction with a meeting of the American Iris Society. Guide: Dr. G. M. Reed.

June 15. Rock Garden Day. Guide: Mr. Montague Free.

September 21. Water Lily Day. Guide: Dr. Arthur Harmount Graves.

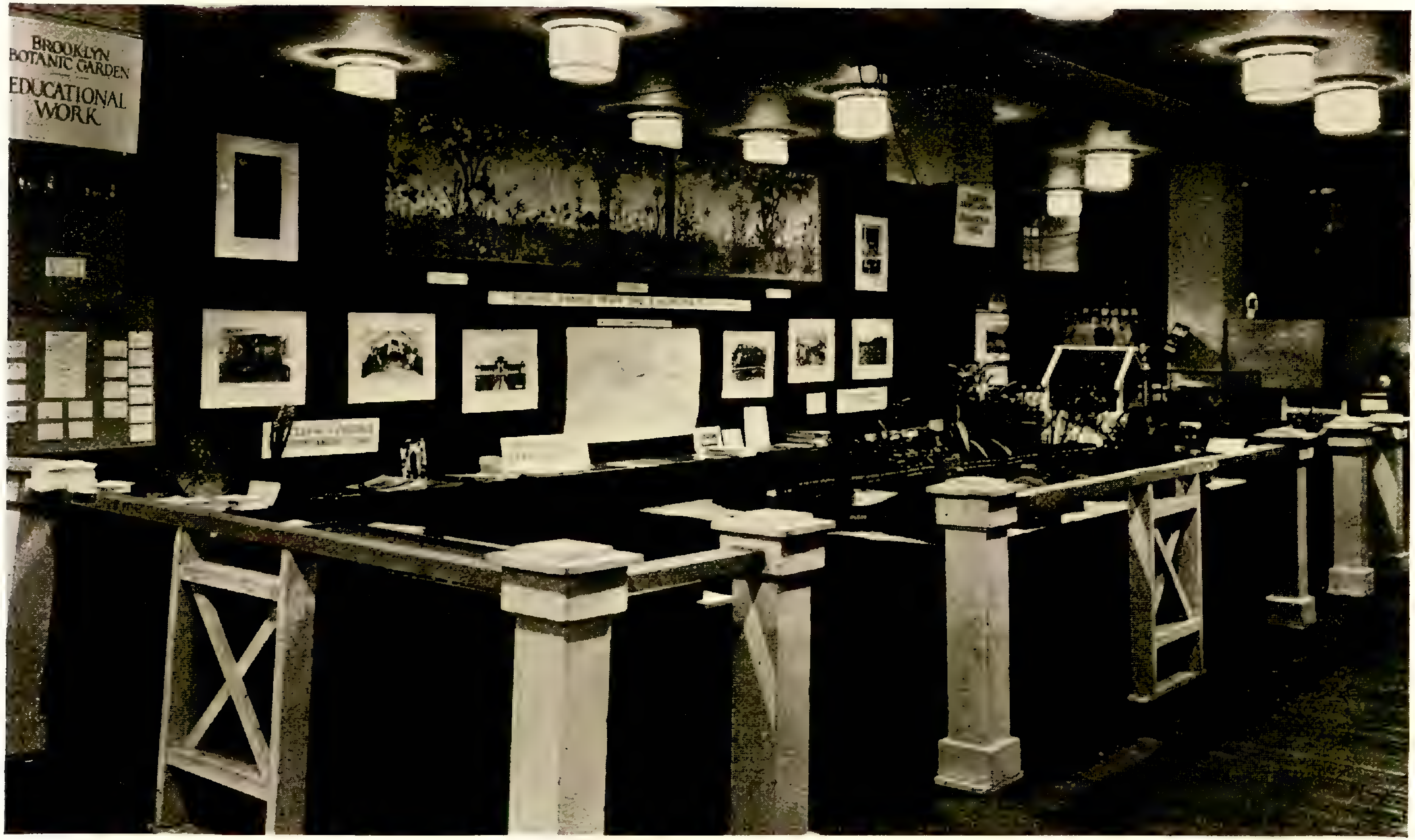

FIG. 11. Exhibit of Brooklyn Botanic Garden at the Fifteenth International Flower Show, Grand Central Palace, Manhattan, March 19–24. (Photo by Peter A. Juley & Son.)

October 5. Canna Day. Guide: Dr. Alfred Gundersen.

November 2. Chrysanthemum Day. Guide: Dr. Alfred Gundersen.

An illustrated folder announcing these different occasions was mailed to members of the Garden.

*Postcard Bulletins to Members.* On April 26 a postcard bulletin was sent to members announcing that a surplus supply of 600 chrysanthemum cuttings was available for distribution. In May, another announcement was sent reminding members that seed and nursery catalogs were on file in the Garden Library for consultation. Attention was called to those catalogs dealing with rock garden plants, native plants of the eastern and western United States, and European alpines.

*Tree Study Calendar.* The school year 1928–1929 being the year for tree study in the New York City schools, I prepared a list of common trees suitable for study in the schools, the different species being grouped month by month according to some prominent feature, connected, as far as possible, with the season of the year. This list was made at the request of Mr. Van Evrie Kilpatrick, vice-president of the School Garden Association of New York, in charge of Nature-Garden work in New York City schools, and through his organization these tree calendars were sent out to more than 12,000 teachers.

*Collection of American Woods.* During the past year a steel cabinet has been obtained for housing the collection of 38 different American woods received by the Garden several years ago from Pratt Institute. The collection consists of sections of tree trunks averaging about 8 inches in diameter, one half (lengthwise) of the upper portion of the trunk being removed in such a way that both one half of the cross section and the whole radial section are exposed. Each species has been neatly labelled with the botanical and scientific names according to the new check list of the United States (U.S.D.A. Miscellaneous Cir. 92, 1927), and the exposed wood surfaces have been given a moderate polish. They are now arranged on the shelves of the cabinet in systematic order, beginning with the conifers.

*Boy Scout Examinations.* As usual, I have given occasional tests to Boy Scouts seeking to acquire merit badges in Conservation and Forestry.

*Bureau of Information.* Numerous requests for information, advice, and identification of plants submitted have been answered personally by telephone and by letter. Although this part of the work needs only brief mention, it should be stated that it takes a large part of my time. The mere listing of the questions asked would fill many pages.

*Research.* A report of the research work on forest pathology during the past year appears on pages 57–59.

Respectfully submitted,
Arthur Harmount Graves,
*Curator of Public Instruction.*

## REPORT OF THE CURATOR OF ELEMENTARY INSTRUCTION FOR 1928

Dr. C. Stuart Gager, Director.

*Sir:* I hereby present the seventeenth annual report from the Department of Elementary Instruction.

### Garden Classes

The attendance in our classes, both of the regular and the visiting groups, has increased substantially over that of last year, reaching nearly 150,000 in the classes of this department alone. Weekly classes, during the spring and fall, came for intensive work from the following schools.

Adelphi Academy
Brooklyn Training School for Girls
Ethical Culture School
Friends' School
James Madison High School
Maxwell Training School for Teachers
P. S. 2, 18, 36, 89, 206 Brooklyn

These groups are doing work quite different from that done with the regular visiting classes coming for one session only.

Extension classes for teachers have been conducted as usual. $B_2$, Nature Study, had the largest registration in the history of our regular work with teachers, the registration figure being 117.

Over 600 children have registered in the children's Saturday classes. During January a selected group of 52 children was invited Saturday mornings for work in the Club Room in connection with the library. These children were from seven to ten years of age. The work was supervised and dealt with the children's own manifested interest in nature books, and in the nature materials in the room.

A special point has been made of exhibits in the Children's Club Room. An exhibit was set up weekly by the instructor, Mrs. Bartlett, with the help of groups of children. These exhibits covered a range of interests, such as decorative house plants, twigs for early forcing trees, plants for Christmas decoration, different types of indoor gardens, etc.

The outdoor garden classes spent rather more time than usual on flower gardens and notebooks.

## Seed Work

Over 550,000 penny packets of seed were distributed to children through the schools during 1928.

## Nature and Plant Material Supplied to Schools

More than 800 requests have come to us from schools for nature material in one form or other. This figure includes the requests from schools which have been supplied with over 18,000 living plants, for classwork and for purpose of decoration, and about 30,000 seedling plants, which have been raised by our classes, for use in school and home gardens.

Over 70,000 children have received help through the nature material sent to schools for use in the classroom.

It might be of interest here to state that our three greenhouses given over to instruction, out of which annually thousands of plants go to schools and to classes for instruction purposes, are maintained almost entirely by work done by this Department and by children. Increase of stock is carried on through cuttings and seeds, and each season ferns are supplied through the work of the Resident Investigator, Dr. Benedict. Most of our plants for desert gardens, and some other specimen plants are supplied by the Horticulturist, Mr. Free. Very few stock plants are ever bought.

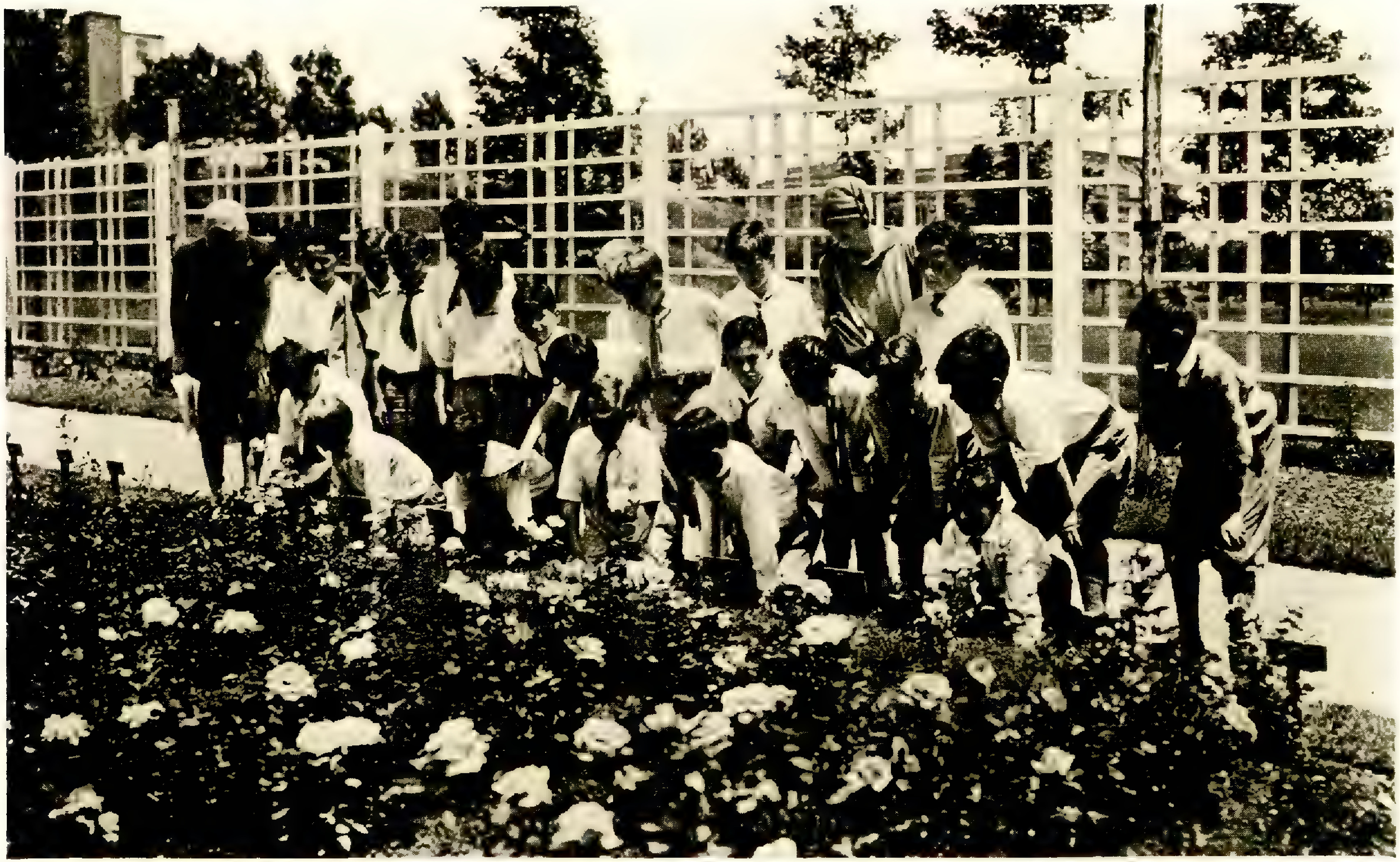

FIG. 12. Rose Garden. First class (from Public School 206, Brooklyn) to be taken to the garden for instruction. June 25. (6516.)

## Exhibits

Twenty-four exhibits have been participated in during 1928. The most outstanding are the following:

*At the International Flower Show,* Grand Central Palace, an exhibit was set up by the departments of public and elementary education to show the work done by our institution in this field.

*At the United Parents Association Exposition,* Grand Central Palace in April, where an exhibit was set up similar to the one for the Flower Show.

*At the Girl Scout Exhibit,* Thirteenth Regiment Armory, Brooklyn, also in April, we assisted in setting up the Garden Booth, with seedlings and plots of grass started in our greenhouses, with a group of Scouts.

*At the Spring Inspection* of the Botanic Garden, in May, the exhibit was educational. This Department did its part in showing work done with visiting classes, greenhouse classes, and the outdoor garden.

*At the American Museum of Natural History* in September, an exhibit of garden flowers was set up in their model " Nature Room."

*At the Seventh Annual Exposition of Woman's Arts and Industries,* in October, our booth represented a section of one of our teaching greenhouses. The plan for this was made and carried out by Mrs. Bartlett, instructor, who also demonstrated from time to time such operations as the potting of bulbs and the making of cuttings to show the value of the greenhouse in education. A contest was held daily at the Exposition in flower arrangement, sponsored by our Woman's Auxiliary. We assisted in each day's judging.

*At the Botanic Garden,* on December 30, exhibits were set up in Room 327, and in the Children's Club Room, for the benefit of the American Nature Study Society. The exhibit in the Club Room was typical of the regular Saturday work with children. In Room 327 a display was made of the work we are doing with visiting classes, teachers classes, and the children's classes in the outdoor garden.

*At the Botanic Garden,* during the months of October, November, and December, exhibit material was prepared weekly for P. S. 42 and 18.

*At the Botanic Garden,* every Tuesday during the fall, an exhibit was arranged for the $B_2$ classes. This exhibit carried out the theme of the day's lesson, and was prepared and set up by Miss Sargent and Miss Marcy.

All these exhibits have taken a great amount of time and have been most worth while, but perhaps have been too numerous for any one year.

## Special Departmental Features

A House Plant Contest was sponsored by the Woman's Auxiliary, and staged in the rotunda of our building in February. Entries were made in four classes as follows: flowering plants, foliage plants, ferns, and bulbs.

Miss Hammond, assistant curator, visited during the summer over 300 backyard gardens of the children in Beacon, N. Y. In September one of our own children's medals was presented for the best backyard garden in Beacon cared for by a child.

The curator has written a series of 39 articles for the New York *Sun,* and a monthly article, beginning in October, for the *American Home.*

A new syllabus on Sugar has been printed; also a series of information folders on our Children's Club Room, "Children's Classes," "Outdoor Garden," for distribution at the International Flower Show and the Spring Inspection.

The American Nature Study Society was entertained at the Garden on December 30. This Society, meeting with the American Association for the Advancement of Science, came to the Garden to see our educational work. The luncheon served was provided by the Garden Teachers Association of the Brooklyn Botanic Garden and the Woman's Auxiliary.

The Alfred T. White scholarship was awarded this year to Alfred Marshak, a Sophomore at Cornell University.

## Personal Activities

I continued to act as National Secretary of the National Plant, Flower and Fruit Guild.

I was appointed Secretary-Treasurer of the American Nature Study Society at the last meeting of this society, in December.

Respectfully submitted,

Ellen Eddy Shaw,
*Curator of Elementary Instruction.*

## REPORT OF THE LIBRARIAN FOR 1928

Dr. C. Stuart Gager, Director.

*Sir:* I take pleasure in submitting herewith my report for the year ending December 31, 1928.

The total number of publications received was 9,740. 1,650 volumes were added to the library, as compared with 622 volumes during 1927. 1,105 newly bound volumes were collated and prepared for circulation. The increase in pamphlets and parts over the previous year is 847.

The Library now comprises a collection of almost 23,000 volumes and pamphlets. Our current periodical and serial file approximates 900 titles, and from this source, we received over 7,390 numbers, or parts of publications, by exchange, gift, purchase, or by publication.

### Reference Work

We have had, as usual, our quota of teachers, students, artists, authors, nurserymen, landscape architects, journalists, and even bookshops, asking for help, either in person or through correspondence, or by telephone. Over 1,350 reference questions were answered in the library, and of these one-third were asked by the general public.

How deeply rooted the connection is between the Brooklyn Botanic Garden and the practical life of the financial and commercial world may be shown by two or three instances here cited.

Two of the largest utility companies of Manhattan, having a common electrical laboratory, sent one of their pathologists for an article which contained an illustration of a chisel forceps. This forceps would enable him to obtain samples for a culture of the diseased part of timber without splitting the wood. A firm of financial agents and bankers, of lower New York, telephoned for the loan of a volume, in order to photostat an article. (Their engineer delayed his departure for Mexico until he received the photostat.) The librarian of a large advertising agency of the metropolitan district of New York telephoned for the loan of a number of agricultural titles.

FIG. 13. Artists painting Iris along the Brook, Brooklyn Botanic Garden. May 25. (5957.)

A member of the Public Service Commission of Louisiana wrote asking for all the information we could give him on the Ramie plant. We sent him a bibliography of about thirty citations, a copy of the article in Bailey's Cyclopedia of Agriculture, and he was also referred to the U. S. Department of Agriculture, and the U. S. Department of Commerce, for any later bulletins these departments might be preparing for publication.

It is almost too bizarre to conjure up the thought of a vaudeville artist asking the help of a Botanic Garden library for his professional "trick." Yet such was actually the case. Contrast this with the request of a pre-medical student at Columbia University asking for all the information we could give him concerning Vesalius; or a professor of a university is given a list of titles on drug plants and illustrations of medicinal plants; or a former university professor, and an authority on gutta percha, pores over our file of the Malayan Agricultural Journal.

In order to set up a tropical scene at a flower show, a horticultural society of a nearby state writes for a list of titles containing plates of tropical plants growing in communities.

An artist desires to see colored illustrations of cane sugar, so that she may illustrate an economic botany for the southern states as an advertisement for a popular "soft" drink; or another artist calls for illustrations of cultivated flowers to be used as designs in the making of wood blocks; or, an author who is writing a book on flower arrangement and floral designs is given all possible help.

Requests for books and seed catalogs on Roses, Iris, Cacti, Houseplants, Evergreens, and Rock Gardens, are perennial.

## Accessions

Of the larger sets acquired we might mention *Curtis's Botanical Magazine,* London, 152 volumes, 1787–1927, and the *Annals of Botany,* London, 42 volumes, 1887–1927. We were fortunate in securing complete sets of these much used publications, as both titles were on our shelves as deposits, through the generosity of the Brooklyn Public Library, with the understanding that the volumes were to be returned when needed, and certainly just as soon as any part of the new building could house them.

We also secured the valuable *Die Landwirtschaftlichen Versuchs-Stationen,* 106 volumes, 1859–1927; *Beiträge zur Biologie der Pflanzen,* 5 volumes; *Jahresbericht der Vereinigung . . . der angewandten Botanik,* volumes 1–16; *Anales Sociedad Científica Argentina,* volumes 89–100; *Annali di Botanica,* Rome, volumes 1–17. We also acquired Gustav Hegi's *Illustrierte Flora von Mittel-Europa,* 11 volumes, and Konrad and Maublanc's *Icones Selectae Fungorum,* volumes 1–3, 1924–27.

In view of the development of the Rose Garden, it may be interesting to mention that we secured Ellen Willmott's *The Genus Rosa,* drawings by Alfred Parsons, 1914, 2 volumes; Schleiden's *Die Rose. Geschichte und Symbolik in Ethnographischer und Kulturhistorischer Beziehung. Ein Versuch,* 1873; and eleven volumes of the *Rose Annual,* the organ of the National Rose Society, Croydon, England.

Some of the titles added to the Pre-Linnaean collection, and purchased with the Gager Fund, are the *Herbarius Latinus,* printed in Venice, in 1499, and belonging to the incunabula. This copy is the second edition of the *Herbarius Latinus* printed in Italy, and reprinted from the 1491 edition of Achates.

Charles Estienne's *De re Hortensi Libellus* . . . 1536; Columella's *De re Rustica,* Libri xii, 1541; *Histoire des Plantes de M. Leonhart Fuschsius, avec les noms Grecs, Latins, & Fracoys,* 1549, the first French edition of this work; Matthias de Lobel's *Kruydtboeck* . . . 1581; Ferrante Imperator's *Dell'Historia Naturale* . . . Libri xxviii, 1599.

Francesco Redi's *Esperienze Intorno* . . . 1671; Nicholas Culpepper's *English Physician Enlarged,* 1676; A. Q. Rivinus' *Introductio Generalis in Rem Herbariam,* 2 volumes, 1690–91. *The Compleat Gard'ner* . . . by the Famous Monsr. de la Quintinye . . . made English by John Evelyn, Esquire, 1693. Leeuwenhoek's *Opera Omnia,* 4 volumes, 1695–1719. Joseph Pitton de Tournefort's *Histoire des Plantes* . . . *aux Environs de Paris* . . . 1698.

Commelin's *Praeludia Botanica* . . . 1703; *Anthologia sive de Floris Natura* . . . by Pontedera, 1720; Colonna's *Plantarum Aliquot* . . . *Historia* . . . 1744; John Hill's *Eden, or a Compleat Body of Gardening* . . . 1757.

The Gager Fund also secured the *Annals of Botany,* 42 volumes, and the *Annali de Botanica,* 14 volumes; Willmott's *Genus Rosa,* 2 volumes, 1914; Penzig and Saccardo's *Icones Fungorum Javanicorum,* 2 volumes, 1904; Gunther's *Herbal of Apuleius Barbarus,* from the early twelfth-century manuscript formerly in the Abbey of Bury St. Edmunds, 1925.

Forty-one volumes were added to the Boys' and Girls' Club Room collection, bringing the total to 240 volumes. Eleven volumes were also donated to the Children's Garden House collection.

## Periodicals and Serials

New titles added to the current list of periodicals and serials are the *Report,* and *Bulletin,* of the Department of Agriculture, Kenya Colony and Protectorate, Africa; *Bulletin of the American Dahlia Society, Inc.; Archives de Botanique, Mémoires,* Caen; *Beiträge zur Biologie der Pflanzen; Arbeiten, Jardin du Botanique Treub-Laboratorium,* Buitenzorg; Botanical Papers issued by the Carnegie Museum, Pittsburgh, Penna.

*La Costa Azzurra Agricola,* Floreale, Sanremo; *Memoirs,* Cotton Research Station, Trinidad, of the Empire Cotton Growing Corporation; *Mededeelingen,* Proefstation Midden-Java, Java; *Memoirs,* College of Agriculture of the Kyoto Imperial University, Kyoto, Japan; *Lotos, Naturwissenschaftliche Zeitschrift; National Horticultural Magazine,* Washington, D. C.; *New Jersey Dahlia News; Oxford Forestry Memoirs; Mededeelingen, Phytopathologisch Laboratorium "Willie Commelin Scholten,"* Amsterdam; *Roosevelt Wild Life Annals; Scientific Monthly; Scottish Forestry Journal; Bulletin,* Société Botanique de Bulgarie; *Reports,* Swedish Institute of Experimental Forestry, Stockholm; *Bulletin,* new series, Department of Agriculture, Tasmania; *Arshefte, Tromsø Museum,* Tromsø, Norway.

## Binding

Over 450 volumes were prepared and forwarded for binding in the early part of the year. This number, together with 651 volumes forwarded in December, 1927, were returned in 1928, and the total, 1,105 newly bound volumes, were collated and prepared for use. In December, 1928, we forwarded another 211 volumes, including about 2,100 annual reports, bulletins, and circulars of agricultural experiment stations and U. S. Bulletins.

888 volumes were formed, and accessioned, by the binding of completed serials, periodicals, and documents.

## Inter-Library Loans

Twenty-two titles were loaned to the Brooklyn Museum; Columbia University; Carnegie Institution of Washington, Cold Spring Harbor, Long Island; Long Island College; Princeton University; University of Pennsylvania; Medical Society of the County of Kings; Rockefeller Institute, New York.

Fifty-five books were borrowed for the Garden staff from the

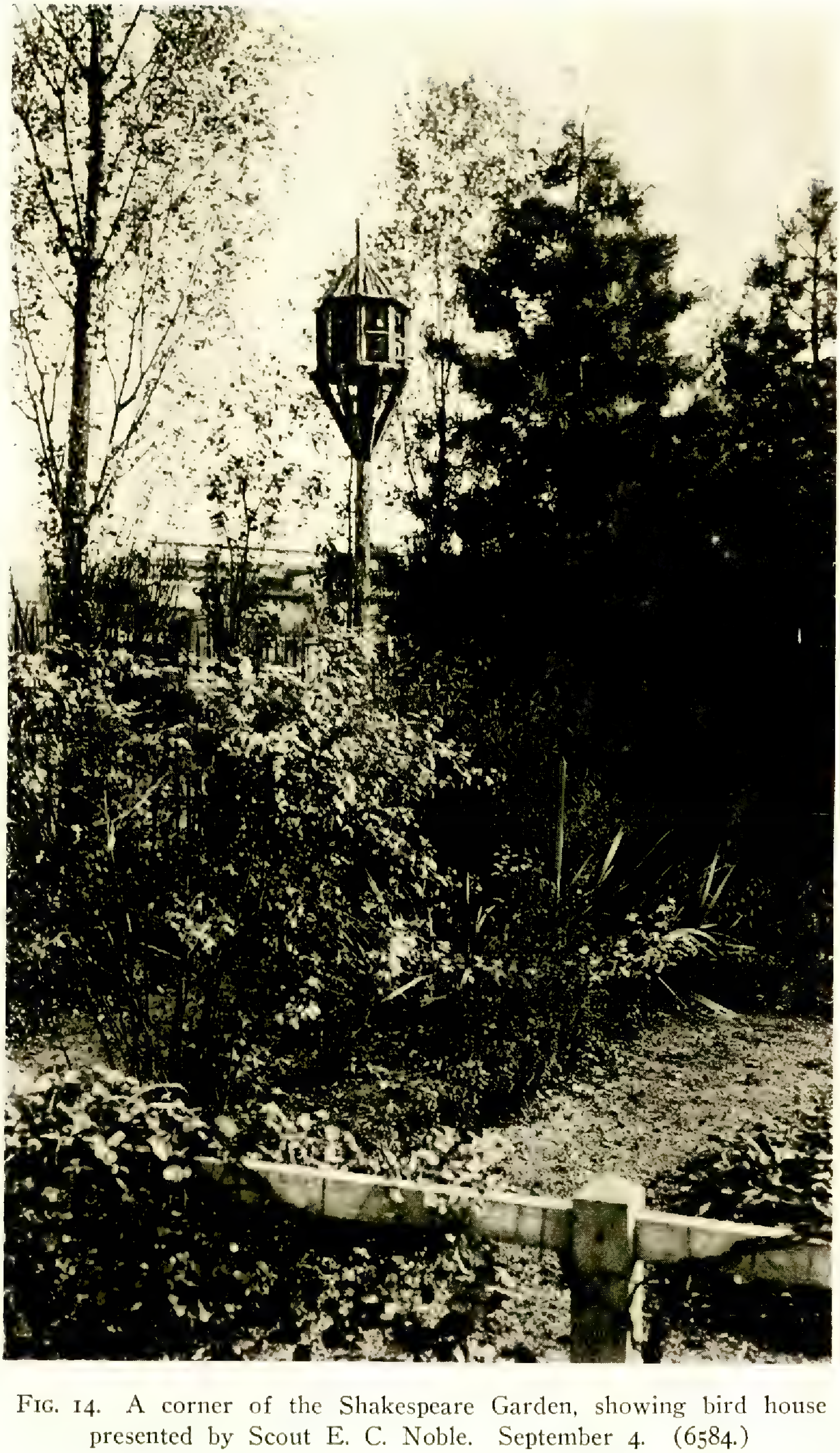

Fig. 14. A corner of the Shakespeare Garden, showing bird house presented by Scout E. C. Noble. September 4. (6584.)

American Museum of Natural History; Brooklyn Museum; Brooklyn Public Library; Columbia University; Rockefeller Institute; Arnold Arboretum; Medical Society of the County of Kings.

## Miscellaneous

271 volumes were transferred during the year to the Overflow Collection, bringing the total of volumes in this collection to 3,497.

New stacks for the balcony and the second floor of the stack room are urgently needed, for as we go on binding state and federal documents, these titles, when returned bound, need more shelf space. In addition valuable time is lost in transferring volumes from the overcrowded main collection, which could well be spent in more useful work.

The library was represented at the Annual Meeting of the Special Libraries Association at Washington, May 21–25, 1928. The libraries of the United States Department of Agriculture, Bureau of Plant Industries, Bureau of Home Economics, National Academy of Sciences, National Herbarium, and the National Museum, were visited.

On April 21st the librarian visited with the New York Regional Catalogue Group the Philadelphia libraries and museums.

An exhibit of nursery and seed catalogs, on file in the Garden library, was arranged for in early spring. These catalogs included information on rock garden plants; native plants of the eastern and western United States, and European Alpines. Post card bulletins were sent to members advising them of this exhibit.

Exhibits of seed catalogs and books germane to the subject of the five Flower Days were also shown.

An appropriate display of beautifully illustrated volumes, and monographs and works relating to the rose and rose culture, was held on Spring Inspection Day.

For list of donors and gifts see Appendix 1.

The statistical report follows:

# STATISTICAL REPORT ON THE LIBRARY

## Accessions

| | Volumes | Pamphlets | Parts (Including Periodicals) |
|---|---|---|---|
| Exchange | 87 | 212 | 4,626 |
| Gift | 115 | 306 | 1,420 |
| Publication | 0 | 169 | 376 |
| Purchase | 560 | 8 | 962 |
| Bindery | 888 | 0 | 0 |
| Deposit | 0 | 2 | 9 |
| Total | 1,650 | 697 | 7,393 |

| | |
|---|---|
| Total number of volumes in library, December 31, 1927 | 11,674 |
| Number of volumes added during 1928 | 1,650 |
| Total number of volumes in library, December 31, 1928 | 13,324 |
| Total number of pamphlets in library, December 31, 1927 | 8,902 |
| Number of pamphlets added during 1928 | 697 |
| Total number of pamphlets in library, December 31, 1928 | 9,599 |
| Total number of volumes and pamphlets in library, December 31, 1927 | 20,576 |
| Number of volumes and pamphlets added during 1928 | 2,347 |
| Total number of volumes and pamphlets in library, December 31, 1928 | 22,923 |

## Serials, Periodicals, and Documents

| | |
|---|---|
| Subscription | 98 |
| Gift | 78 |
| Exchange | 685 |
| Publication | 11 |
| Total | 872 |

## Cataloguing

| | |
|---|---|
| Books, Pamphlets, and Serials catalogued | 1,494 |
| Total number of cards typewritten and filed | 2,834 |

## Printed Cards

| | |
|---|---|
| Torrey Botanical Club index cards on file, December 31, 1927 | 37,428 |
| Filed during 1928 | 1,153 |
| Total, December 31, 1928 | 38,581 |

| | |
|---|---|
| Index Algarum Universalis cards, December 31, 1927 | 24,419 |
| Number of cards received during 1928 | 0 |
| Total Index Algarum Universalis cards, December 31, 1928 | 24,419 |
| Catalogue en fiches de la Bibliographie Technique et Agricole Tropicale, Institut Colonial de Marseille, received during 1928 | 3,438 |

## Miscellaneous

| | |
|---|---|
| Attendance in library | 6,243 |
| Books loaned to members of staff | 1,101 |
| Books loaned to other institutions | 22 |
| Books borrowed from other institutions | 55 |

Respectfully submitted,

RAY SIMPSON,
*Librarian.*

## FINANCIAL STATEMENT FOR 1928

### I. Tax Budget Accounts

1360 *Personal Service:*

| | | |
|---|---|---|
| Appropriation | $ 72,253.00 | |
| Transferred from Miscellaneous New York City 3070 for Adjustment of Personal Service and Expenses | 2,446.50 | $ 74,699.50 |
| Expended | | 74,699.50 |

1361 *Other Codes than Personal Service:*

Line 1 Fuel Supplies:

| | |
|---|---|
| Appropriation | $ 4,200.00 |
| Expended | 4,200.00 |

Line 2 Office Supplies:

| | |
|---|---|
| Appropriation | $ 500.00 |
| Expended | 500.00 |

Line 3 Laundry, Cleaning and Disinfecting Supplies:

| | |
|---|---|
| Appropriation | $ 80.00 |
| Expended | 80.00 |

Line 4 Botanical and Agricultural Supplies:

| | |
|---|---|
| Appropriation | $ 1,300.00 |
| Expended | 1,300.00 |

| | | | |
|---|---|---|---|
| Line 5 | General Plant Supplies: | | |
| | Appropriation | | $ 350.00 |
| | Expended | | 350.00 |
| Line 6 | Wearing Apparel: | | |
| | Appropriation | | $ 40.00 |
| | Expended | | 40.00 |
| Line 7 | Office Equipment: | | |
| | Appropriation | | $ 200.00 |
| | Expended | | 200.00 |
| Line 8 | General Plant Equipment: | | |
| | Appropriation | $ 1,350.00 | |
| | Supplemental Appropriation (From Miscellaneous New York City 3070 For Adjustments of Personal Service and Expenses) | 1,392.60 | $ 2,742.60 |
| | Expended | | 2,742.60 |
| Line 9 | General Plant Materials: | | |
| | Appropriation | $ 1,650.00 | |
| | Supplemental Appropriation (From Miscellaneous New York City 3070 For Adjustments of Personal Service and Expenses) | 575.00 | $ 2,225.00 |
| | Expended | | 2,225.00 |
| Line 10 | Repairs and Replacements: | | |
| | Appropriation | $ 4,000.00 | |
| | Supplemental Appropriation (From Miscellaneous New York City 3070 For Adjustments of Personal Service and Expenses | 850.00 | $ 4,850.00 |
| | Expended | | 4,850.00 |
| Line 11 | Light, Heat and Power: | | |
| | Appropriation | | $ 350.00 |
| | Expended | | 350.00 |

| | | | |
|---|---|---|---|
| Line 12 | General Plant Service: | | |
| | Appropriation | | $ 500.00 |
| | Expended | | 500.00 |
| Line 13 | Hire of Horses and Vehicles with Drivers: | | |
| | Appropriation | | $ 500.00 |
| | Expended | | 500.00 |
| Line 14 | Telephone Service: | | |
| | Appropriation | | $ 325.00 |
| | Expended | | 325.00 |
| Line 15 | Carfares: | | |
| | Appropriation | | $ 60.00 |
| | Expended | | 60.00 |
| Line 16 | Expressage and Deliveries: | | |
| | Appropriation | | $ 300.00 |
| | Expended | | 300.00 |
| Line 17 | Contingencies: | | |
| | Appropriation | | $ 100.00 |
| | Expended | | 100.00 |

| | | |
|---|---|---|
| *Summary of Tax Budget Accounts:* | | |
| Appropriated | $ 90,504.50 | |
| Supplemental Appropriation | 2,817.60 | $ 93,322.10 |
| Expended | | $ 93,322.10 |

## II. Private Funds Accounts

| | | |
|---|---|---|
| 1. *Endowment Fund* ($50,500.00) *Restricted in Part:* | | |
| Income Account: | | |
| Income 1928 | | $ 2,777.48 |
| Transferred to Endowment Increment Fund | $ 555.50 | |
| Transferred to Special Contributions | 2,221.98 | 2,777.48 |
| | | $ 0.00 |
| 2. *Life Membership Fund* ($6,500.00) *Restricted:* | | |
| Income Account: | | |
| Income 1928 | | $ 350.61 |
| Transferred to Endowment Increment Fund | $ 70.13 | |
| Transferred to Annual Membership Account | 280.48 | 350.61 |
| | | $ 0.00 |

3. *George C. Brackett Library Fund* ($500.00) *Restricted:*

Income Account:

| | | |
|---|---|---|
| Balance, January 1, 1928 | $ 13.14 | |
| Income 1928 | 27.48 | $ 40.62 |
| Expended | $ 5.53 | |
| Transferred to Endowment Increment Fund | 5.50 | 11.03 |
| Balance, December 31, 1928 | | $ 29.59 |

4. *Benjamin Stuart Gager Memorial Fund* ($13,417.20) *Restricted:*

Income Account:

| | | |
|---|---|---|
| Balance, January 1, 1928 | $ 676.02 | |
| Income 1928 | 737.92 | |
| Transferred from Collections Fund | 160.00 | $ 1,573.94 |
| Expended | $ 1,374.04 | |
| Transferred to Endowment Increment Fund | 147.58 | 1,521.62 |
| Balance, December 31, 1928 | | $ 52.32 |

5. *Martha Woodward Stutzer Memorial Fund* ($10,000.00) *Restricted:*

Income Account:

| | | |
|---|---|---|
| Balance, January 1, 1928 | $ 294.19 | |
| Income 1928 | 550.00 | $ 844.19 |
| Expended | $ 27.57 | |
| Transferred to Endowment Increment Fund | 110.00 | 137.57 |
| Balance, December 31, 1928 | | $ 706.62 |

6. *Mary Bates Spalding Fund* ($2,697.00) *Restricted:*

Income Account:

| | | |
|---|---|---|
| Balance, January 1, 1928 | $ 155.72 | |
| Income 1928 | 148.32 | $ 304.04 |
| Expended | $ 176.00 | |
| Transferred to Endowment Increment Fund | 29.66 | 205.66 |
| Balance, December 31, 1928 | | $ 98.38 |

7. *Special Account W.* ($243,149.27) *Restricted:*

Income Account:

| | | |
|---|---|---|
| Balance, January 1, 1928 | $ 267.65 | |
| Income 1928 | 13,373.20 | $ 13,640.85 |

| | | |
|---|---|---|
| Expended | $ 150.67 | |
| Transferred to Endowment Increment Fund | 2,674.64 | |
| Transferred to Special Contributions | 10,500.00 | 13,325.31 |
| Balance, December 31, 1928 | | $ 315.54 |

8. *A. Augustus Healy Bequest* ($9,798.31) *Restricted:*

Income Account:

| | | |
|---|---|---|
| Income 1928 | | $ 538.88 |
| Transferred to Endowment Increment Fund | $ 107.78 | |
| Transferred to Special Contributions | 431.10 | 538.88 |
| | | $ 0.00 |

9. *Robert B. Woodward Bequest* ($25,000.00) *Restricted:*

Income Account:

| | | |
|---|---|---|
| Income 1928 | | $ 1,375.00 |
| Transferred to Endowment Increment Fund | $ 275.00 | |
| Transferred to Special Contributions | 1,100.00 | 1,375.00 |
| | | $ 0.00 |

10. *Alfred T. White Memorial Tablet Fund* ($3,889.85) *Restricted:*

Income Account:

| | | |
|---|---|---|
| Income 1928 | | $ 213.92 |
| Transferred to Endowment Increment Fund | $ 42.78 | |
| Transferred to Special Contributions | 171.14 | 213.92 |
| | | $ 0.00 |

11. *Brooklyn Institute Centennial Fund B. B. G. Share* ($30,000.00) *Restricted:*

Income Account:

| | | |
|---|---|---|
| Income 1928 | | $ 1,650.00 |
| Transferred to Endowment Increment Fund | $ 330.00 | |
| Transferred to Special Contributions | 1,320.00 | 1,650.00 |
| | | $ 0.00 |

12. *John D. Rockefeller, Jr., Fund* ($250,000.00) *Restricted:*

Income Account:

| | | |
|---|---|---|
| Balance, January 1, 1928 | $ 3,701.88 | |
| Income 1928 | 13,750.00 | $ 17,451.88 |
| Expended | $ 4,563.61 | |
| Transferred to Endowment Increment Fund | 2,750.00 | |
| Transferred to Special Contributions | 7,401.39 | 14,715.00 |
| Balance, December 31, 1928 | | $ 2,736.88 |

13. *Citizens Endowment Fund* ($253,929.26) *Restricted:*

| | | |
|---|---|---|
| Income Account: | | |
| Income 1928 | | $ 13,966.10 |
| Transferred to Endowment Increment Fund | $ 2,793.22 | |
| Transferred to Special Contributions | 11,172.88 | 13,966.10 |
| | | $ 0.00 |

14. *Sustaining Membership. Restricted:*

| | |
|---|---|
| Received from dues 1928 | $ 566.46 |
| Transferred to Annual Membership | 549.80 |
| Balance, December 31, 1928 | $ 16.66 |

15. *Annual Membership. Restricted:*

| | | |
|---|---|---|
| Balance, January 1, 1928 | $ 1,856.67 | |
| Received from dues 1928 | 6,040.00 | |
| Transferred from Life Membership | 280.48 | |
| Transferred from Sustaining Membership | 549.80 | |
| Transferred from Special Purposes (Printing Flower Games Booklets) | 20.00 | $ 8,746.95 |
| Expended | $ 4,361.34 | |
| Transferred to Special Contributions | 1,620.00 | 5,981.34 |
| Balance, December 31, 1928 | | $ 2,765.61 |

16. *Tuition and Sales. Restricted:*

| | | |
|---|---|---|
| Balance, January 1, 1928 | $ 252.37 | |
| Received 1928: | | |
| *a.* Tuitions | 1,736.70 | |
| *b.* Seed Packets | 5,583.67 | |
| *c.* Sales | 153.60 | |
| *d.* Miscellaneous | 59.84 | $ 7,786.18 |
| Expended | $ 4,677.17 | |
| Transferred to Endowment Increment Fund | 1,008.21 | |
| Transferred to Special Contributions | 1,000.00 | 6,685.38 |
| Balance, December 31, 1928 | | $ 1,100.80 |

17. *Botanic Garden Collections Fund 1928. Restricted:*

| | | |
|---|---|---|
| Balance, January 1, 1928 | $ 3,795.18 | |
| Received from Contributions | 7,420.25 | |
| Transferred from Special Purposes (Lillies of the Valley) | 13.00 | |
| Transferred from Special Purposes (Rose Garden) | .53 | |
| Transferred from Special Purposes (Hills Boulder Bridge) | 1,405.00 | $ 12,633.96 |

| | | |
|---|---|---|
| Expended | $ 8,948.15 | |
| Transferred to Benjamin Stuart Gager Memorial Fund | 160.00 | |
| Transferred to Special Purposes (Iris Fund) | 242.48 | 9,350.63 |
| Balance, December 31, 1928 | | $ 3,283.33 |

18. *Special Fund (Brooklyn Institute General Endowment Income: Annual Allotment) Restricted:*

| | | |
|---|---|---|
| Income Account: | | |
| Income 1928 | | $ 2,500.00 |
| Transferred to Special Contributions | | 2,500.00 |
| | | $ 0.00 |

19. *Cary Library Fund* ($10,000.00—1/5 *of Income to Brooklyn Botanic Garden) Restricted:*

| | | |
|---|---|---|
| Balance, January 1, 1928 | $ 72.27 | |
| Income Allotment 1928 | 110.00 | $ 182.27 |
| Transferred to Endowment Increment Fund | | 22.00 |
| Balance, December 31, 1928 | | $ 160.27 |

20. *Special Purposes. Restricted by Terms of Gifts:*

| | | |
|---|---|---|
| Balance, January 1, 1928 | $ 3,021.36 | |
| Received: | | |
| *a.* Anonymous for Japanese Garden | 2,100.00 | |
| *b.* Various, for Test Garden for Japanese Iris (including transfer from Collections Fund) | 476.90 | |
| *c.* Special Gifts for Children's Work | 109.50 | |
| *d.* Hills Boulder Bridge | 1,441.00 | $ 7,148.76 |
| Expended | $ 3,674.62 | |
| Transferred to Collections Fund | 1,418.53 | |
| Transferred to Annual Membership | 20.00 | 5,113.15 |
| Balance, December 31, 1928 | | $ 2,035.61 |

21. *Plant Pathology Research Fund. Restricted:*

| | | |
|---|---|---|
| Balance, January 1, 1928 | $ 3,004.30 | |
| Income 1928 | 5,000.00 | $ 8,004.30 |
| Expended | $ 607.69 | |
| Transferred to Special Contributions | 4,640.00 | 5,247.69 |
| Balance, December 31, 1928 | | $ 2,756.61 |

22. *Special Contributions (for 1928 only):*

| | | |
|---|---|---|
| Balance, January 1, 1928 .................. | $ 172.54 | |
| Transferred from | | |
| Endowment Fund Income Account........ | 2,221.98 | |
| Special Account W. Income Account ...... | 10,500.00 | |
| A. Augustus Healy Bequest Income Account | 431.10 | |
| R. B. Woodward Bequest Income Account | 1,100.00 | |
| A. T. White Memorial Tablet Fund Inc. Acct | 171.14 | |
| Brooklyn Inst. Centennial Fund Inc. Acct.. | 1,320.00 | |
| J. D. Rockefeller, Jr., Fund Income Account | 7,401.39 | |
| Citizens Endowment Fund Income Account | 11,172.88 | |
| Annual Membership Account ............ | 1,620.00 | |
| Special Fund (Inst. General Endowment) | 2,500.00 | |
| Plant Pathology Research Fund ......... | 4,640.00 | |
| Tuition and Sales Elementary Instruction.. | 1,000.00 | $ 44,251.03 |
| Expended .......................................... | | 43,487.75 |
| Balance, December 31, 1928 ........................ | | $ 763.28 |

23. *Endowment Increment Fund* ($60,274.55) *Restricted:*

| | | |
|---|---|---|
| Transferred from other accounts 1928....... | $ 10,922.00 | |
| Interest 1928 ............................ | 2,659.26 | $ 13,581.26 |
| Transferred to Principal ............................ | | 13,581.26 |
| | | $ 0.00 |

*Summary of Private Funds Accounts:*

| | | |
|---|---|---|
| Balances, January 1, 1928 ................. | $ 17,283.29 | |
| Income 1928 ............................ | 85,173.61 | $102,456.90 |
| Expended ................................ | $ 72,054.14 | |
| Transferred to Endowment Increment Fund Principal ........................... | 13,581.26 | 85,635.40 |
| Balances, December 31, 1928 ...................... | | $ 16,821.50 |

## III. Summary of Total Maintenance Budget for 1928

*Income*

| | | |
|---|---|---|
| Tax Budget Appropriation (47.7%) ........... | $ 93,322.10 | |
| Private Funds Budget (52.3%) ............... | 102,456.90 | |
| Total ............................................ | | $195,779.00 |
| Transferred to Endowment Increment Fund Principal....... | | 13,581.26 |
| *Available* ............................................ | | $182,197.74 |

| | | | |
|---|---|---|---|
| *Expended* | | | |
| Personal Service | | | |
| Tax Budget | $ 74,699.50 | | |
| Private Funds | 43,487.75 | | |
| Total | | $118,187.25 | |
| Other than Personal Service | | | |
| Tax Budget | $ 18,622.60 | | |
| Private Funds | 28,566.39 | | |
| Total | | $ 47,188.99 | $165,376.24 |
| Balance, December 31, 1928 | | | $ 16,821.50 |

Respectfully submitted,

DANIEL C. DOWNS,
*Secretary and Accountant.*

*Note:*—The above "Financial Statement" is a transcript of Brooklyn Botanic Garden accounts in the books of the Treasurer of the Brooklyn Institute of Arts and Sciences. The Treasurer's accounts are audited annually by a Public Accountant, and a separate audit of this "Financial Statement" is not made in order to save unnecessary expense.

G. FOSTER SMITH,
*Treasurer.*

## APPENDIX 1

## GIFTS RECEIVED DURING 1928

### Collections Fund

Miss E. Addie Austin
Frank L. Babbott
Mrs. George M. Boardman
Walter H. Crittenden
Mrs. John R. Delafield
Otto Ebel
Walter Ebel
Gates D. Fahnestock
John W. Frothingham
Mr. and Mrs. James M. Hills
Miss C. Julie Husson
Edward A. Ingraham
Alfred W. Jenkins
Mrs. A. S. Kirkman
Miss Hlida Loines
Miss Florence E. Longstreet
William G. Low
Mrs. Wm. W. Marshall
Hon. George V. McLaughlin
Horace J. Morse
Mrs. Grace Pullman Perkins
George D. Pratt

Mrs. Nathaniel W. Pratt
William A. Putnam
Mrs. William A. Putnam
Harold Somers
Dr. Edward H. Squibb
Mrs. Seth Thayer Stewart
Miss Elizabeth C. Stoughton
Herman Stutzer
Mrs. Herman Stutzer
Mrs. B. T. Van Nostrand
"C. W."
Mrs. Edward Weck
Miss Frances E. White
Harold T. White
Miss Harriet H. White
Miss Mary Blackburne Woodward
Woman's Club, New Rochelle, N. Y.

## Living Plants

American Rose Society, 2 Roses.
Bobbink and Atkins, 1,287 Roses.
Mrs. P. J. Brady, 3 *Cyripedium acaule*, 4 *C. hirsutum*.
Miss Laura M. Bragg, Plants of *Iris tripetala*.
Dr. Fred N. Briggs, 5 Iris.
Mr. Frank W. Campbell, 8 Iris.
Mr. J. L. Coker, Plants of *Iris verna*.
Mr. Henry A. Dreer (1927–28) 387 Roses.
Mrs. H. M. Edwards, 1 *Achillea millefolium roseum*.
Mr. Earle W. Fellows, 1 *Camptosurus rhizophyllus*.
Mr. Thomas M. Fendall, 3 Iris.
Mrs. H. Harris, 1 *Dracaena fragrans*.
Mr. Roy Hart, 45 Iris.
Dr. Harris Kennedy, 17 Iris.
Mr. A. L. Keysner, 1 *Echinocactus Wislizeni*.
Miss Susan C. Lovering, Plants of *Iris verna*.
Mr. Franklin B. Mead, 3 Iris.
Oregon Gardens, 6 *Phlox diffusa*, 2 *P. rigida*.
Miss Isabella Preston, 11 Iris.
Mr. Ernest Schupp, 1 *Datura suaveolens*.
Mr. Ralph W. Shreve, 68 plants, representing 17 species.
Mr. Augustus C. Sulzer, 1 Opuntia.
Miss Venetia C. Taylor, 2 *Cypripedium acaule*, 1 *Erythronium americanum*, 1 *Trillium erectum*, 1 *T. undulatum*, 3 *Podophyllum peltatum*, 6 *Linaria canadensis*, 3 *Polygonatum multiflorum*.
The New Brunswick Nurseries (1927–28) 770 Roses.
The Rose Farms (1927–28) 167 Roses.
The Wayside Gardens Co., 27 Iris.
Miss Maude E. Voris, 24 Lilies, 7 Roses.
Mr. P. Weller, Weller Nurseries Co., Inc., 45 Iris.
Mr. Josiah Whitnel, 1 Paeonia.
Mrs. M. M. Wilson, 9 Dahlia.
Mr. L. Herman Wreckland, 1 *Mangifera indica*.

## Seeds

Mrs. George Brown (1)
Mr. Lorenz Cantor (7)
Mr. J. E. Dann (1)
Prof. Hugo De Vries (2)
Mr. G. P. Englehardt (2)
Mr. Lowell C. Frost (4)

## Phanerogamic Herbarium

Prof. W. P. Collam, 15 specimens from Utah.
Dr. J. A. Drushel, 12 specimens.
Mr. Norman Taylor, 101 specimens from the Catskill Mountains, N. Y.
Mrs. Mary Ormsbee Whitton, 185 specimens collected in Norway.

## Cryptogamic Herbarium

No accessions by gift during 1928.

## Iris Project

### *Special Fund*

| | |
|---|---|
| William J. Matheson | $ 100.00 |
| Herbert S. Smith | 5.00 |
| Mrs. Wheeler H. Peckham | 29.32 |
| American Iris Society | 100.00 |
| Brooklyn Botanic Garden | 242.48 |
| | $ 476.80 |

### *Plants*

Gifts of Plants for the Iris Project are listed on page 62.

## For Boulder Bridge

| | |
|---|---|
| Mrs. John Hills | $1,441.00 |

## Miscellaneous

*For Japanese Garden*

| | |
|---|---|
| Anonymous | $2,100.00 |

*Special Gifts for Children's Work*

| | |
|---|---|
| Anonymous | 100.00 |
| Mrs. Glentworth R. Butler | 9.00 |
| Frank Matteo | .50 |

## Library

### Books

| | |
|---|---|
| Prof. Oakes Ames, University Museum, Cambridge, Mass. | 1 |
| Walter Baker & Company, 159 Franklin Street, New York City | 1 |
| Mrs. L. H. Bartlett, Brooklyn, N. Y. | 1 |
| Brooklyn Botanic Garden Lunch Club | 1 |
| Brooklyn, Department of Parks, Brooklyn, N. Y. | 1 |
| Mrs. Paul Casamajor, 372 Greene Avenue, Brooklyn, N. Y. | 4 |
| Carnegie Institution of Washington, Washington, D. C. | 4 |
| Miss Kathryn P. Clark, Brooklyn, N. Y. | 1 |
| Mr. G. Claridge Druce, Secretary of the Botanical Society & Exchange Club of the British Isles, Yardley Lodge, 9 Crick Road, Oxford, Eng. | 1 |
| Mrs. L. v Foelkersamb, 127 Clinton Avenue, Brooklyn, N. Y. | 14 |
| Mr. H. C. Folger, Brooklyn, N. Y. | 10 |
| Miss Olive Hyde Foster, Elmhurst, New Jersey | 1 |
| Mrs. Lewis W. Francis, 81 Remsen Street, Brooklyn, N. Y. | 7 |
| Dr. C. Stuart Gager, Brooklyn, N. Y. | 15 |
| Mrs. C. Stuart Gager, Brooklyn, N. Y. | 1 |
| Miss Prudence Gager, Brooklyn, N. Y. | 1 |
| Geological Survey of Alabama, University, Alabama | 1 |
| Mr. Bernard Goodman, 756 Nostrand Avenue, Brooklyn, N. Y. | 1 |
| Master Jack Goodman, 756 Nostrand Avenue, Brooklyn, N. Y. | 1 |
| Dr. Arthur H. Graves, Brooklyn, N. Y. | 2 |
| Group of older boys & girls from Boys' & Girls' Club | 11 |
| Hokkaido Imperial University, Sapporo, Japan | 1 |
| Secretary of State for India in Council | 1 |
| James Madison High School, Biology Club | 2 |
| Dr. Ernest Lehmann, Tübingen, Germany | 1 |
| Maxwell Training School for Teachers, Brooklyn, N. Y. | 1 |
| Mrs. Joseph Midas, 445 Rogers Avenue, Brooklyn, N. Y. | 1 |
| Mothers' Club of P. S. 123, Brooklyn, N. Y. | 5 |
| National Fourth Chun San University, University Library, Nanking, China | 1 |
| National Research Council of Japan, Tokyo, Japan | 1 |
| Newark Museum, Newark, New Jersey | 1 |
| New York State Conservation Committee, Albany, N. Y. | 1 |
| Mrs. Emma Peirce, 1776 15th Avenue W., Vancouver, B. C. | 1 |
| St. Brigid's School, Brooklyn, N. Y. | 1 |
| Miss Agnes Shaw, Highland Hall, Hollidaysburg, Pa. | 1 |
| Miss Ellen Eddy Shaw, Brooklyn, N. Y. | 1 |
| Mr. Harry Dodd Sheldon, 386 Stuyvesant Avenue, Brooklyn, N. Y. | 1 |
| Miss Ray Simpson, Brooklyn, N. Y. | 1 |
| The Smithsonian Institution, Washington, D. C. | 1 |

| | |
|---|---|
| Miss Alys Sutcliffe, Brooklyn, N. Y. | 1 |
| Mr. Norman Taylor, Brooklyn, N. Y. | 1 |
| Tokyo Botanical Society, Botanical Gardens, Koishikawa, Tokyo, Japan | 1 |
| Mr. E. Phillips Turner, Director of Forestry, State Forest Service, Wellington, New Zealand | 1 |
| United States Department of Agriculture, Washington, D. C. | 6 |
| Mrs. Ica Waldes, Long Island City | 1 |
| Miss Meta Weihl, P. S. 139, Brooklyn, N. Y. | 1 |
| Total | 115 |

### PAMPHLETS

| | |
|---|---|
| American Colony, P. O. Box 19, Jerusalem, Palestine | 2 |
| Brooklyn Museum Library, Eastern Parkway, Brooklyn, N. Y. | 5 |
| Dr. Betty Watt Brooks, Carnegie Museum, Pittsburgh, Pa. | 1 |
| Carnegie Institution of Washington, Washington, D. C. | 3 |
| Carnegie Institution of Washington, Department of Genetics, Cold Spring Harbor, L. I. | 21 |
| Prof. Dr. Robert Chodat, Geneva, Switzerland | 19 |
| Dr. Leonard Cockayne, Ngaio, New Zealand | 3 |
| Dr. Carl Correns, Berlin-Dahlem, Germany | 2 |
| Dr. Oliver A. Farwell, Box 488, Detroit, Michigan | 1 |
| Prof. Wladimir W. Finn, Kiev, Ukraine, Narawejeuskeja 17–3 | 1 |
| Foreign Policy Association, 18 East 41st Street, New York | 2 |
| Dr. C. Stuart Gager, Brooklyn, N. Y. | 163 |
| Prof. R. Ruggles Gates, King's College, London, England | 2 |
| Dr. Karl Goebel, Munich, Germany | 6 |
| Dr. Hubert D. Goodale, Williamstown, Mass. | 9 |
| Dr. Arthur H. Graves, Brooklyn, N. Y. | 2 |
| Dr. Benjamin C. Gruenberg, 370 7th Avenue, New York City | 1 |
| Dr. Alfred Gundersen, Brooklyn, N. Y. | 12 |
| Dr. Roland M. Harper, University, Alabama | 2 |
| Prof. Joseph Edward Kirkwood, State University, Missoula, Montana | 8 |
| Dr. Albert E. Longley, Bureau of Plant Industry, Washington, D. C. | 2 |
| Dr. Biagio Longo, Instituto Botanico della R. Università di Pisa, Pisa, Italy | 1 |
| Mr. Lucien Reychler, Saint-Nicolas (Waes) Belgium | 2 |
| Rothamsted Experiment Station, Department of Mycology, Harpenden, Herts, England | 5 |
| Dr. Harold St. John, State College of Washington, Pullman, Washington | 1 |
| Miss Ellen Eddy Shaw, Brooklyn, N. Y. | 2 |
| Miss Ray Simpson, Brooklyn, N. Y. | 1 |
| Dr. Marius J. Sirks, Wageningen, Holland | 5 |

| | |
|---|---|
| Dr. J. Valchenier Suringar, Wageningen, Holland | 2 |
| Prof. Tyôzaburô Tanaka, 42 West 124th Street, New York City | 17 |
| Mr. Norman Taylor, Brooklyn, N. Y. | 1 |
| Dr. Hermann Zillig, Berncastel-Cues a.d. Mosel, Germany | 2 |
| Total | 306 |

### Parts of Publications

*(Exclusive of Government Documents)*

| | |
|---|---|
| American Colony, P. O. Box 19, Jerusalem, Palestine | 14 |
| American Eagle, Estero, Florida | 80 |
| American Horticultural Society, Washington, D. C. | 22 |
| Mr. Henry I. Baldwin, Berlin, N. H. | 2 |
| Bartlett Tree Laboratories, Stamford, Conn. | 1 |
| Dr. Ralph Benedict, Brooklyn, N. Y. | 16 |
| Block Garden Guild of Long Island, N. Y. | 1 |
| Brooklyn Museum Library, Eastern Parkway, Brooklyn, N. Y. | 36 |
| Carnegie Institution of Washington, Washington, D. C. | 1 |
| Chicago Academy of Sciences, Chicago, Ill. | 2 |
| City Gardens Club, New York City | 2 |
| The Explorers' Club, 47 West 76th Street, New York City | 8 |
| Mr. Montague Free, Brooklyn, N. Y. | 12 |
| Dr. C. Stuart Gager, Brooklyn, N. Y. | 218 |
| Garden Club of America, 598 Madison Avenue, New York City | 3 |
| General Lord Sterling Society, National Society, Children of the American Revolution, 649 East 19th Street, Brooklyn, N. Y. | 3 |
| Dr. Arthur H. Graves, Broooklyn, N. Y. | 2 |
| Dr. Alfred Gundersen, Brooklyn, N. Y. | 1 |
| Hokkaido Prefectoral Government, Sapporo, Nippon, Japan | 5 |
| Horticultural Society of New York, 598 Madison Avenue, New York City | 2 |
| Dr. Ernest Lehmann, Tübingen, Germany | 1 |
| National Lumber Manufacturers' Association, Transportation Building, Washington, D. C. | 1 |
| National Plant, Flower & Fruit Guild, 70 Fifth Avenue, New York City | 2 |
| National Research Council of Japan, Tokyo, Japan | 1 |
| Naturwissenschaften, Berlin, Germany | 2 |
| Newark Museum, Newark, New Jersey | 1 |
| New York Academy of Sciences, 77th Street & Central Park West, New York City | 30 |
| New York City Department of Health | 45 |
| New York Public Library, New York City | 3 |
| Mr. H. H. Peach, Dryad Works, St. Nicholas Street, Leicester, Eng. | 1 |
| Mr. Winfried Roelker, 12a Monroe Street, Brooklyn, N. Y. | 20 |

| | |
|---|---|
| Miss Helen E. Saunders, 454 Seventh Avenue, Brooklyn, N. Y. | 5 |
| School Garden Association of New York | 18 |
| Miss Ellen Eddy Shaw, Brooklyn, N. Y. | 12 |
| Mrs. Annie Morrill Smith, Bronxville, New York | 1 |
| Mr. Norman Taylor, Brooklyn, N. Y. | 4 |
| Wild Flower Preservation Society, Washington, D. C. | 5 |
| Woman's National Farm & Garden Association, 155 East 42d Street, New York City | 8 |
| Total | 591 |
| Horticultural Society of New York, Inc. Manuscript Report | 1 |

*Portraits*

| | |
|---|---|
| Dr. C. P. Clinton, Connecticut Agricultural Experiment Station, New Haven, Conn. | 1 |
| Dr. Karl Goebel, Munich, Germany | 1 |
| Prof. Seiitiro Ikeno, Faculty of Agriculture, Imperial University, Komaba, Tokyo, Japan | 1 |
| Dr. Frederick C. Newcombe, 1928 Vancouver Highway, Honolulu, Hawaii | 1 |
| Dr. Carl H. Ostenfeld, Director Botanisk Have, Gothersgade, 140, København, Denmark | 1 |
| Prof. Otto Rosenberg, Botaniska Institutet, Stockholm Hogskola, Stockholm, Sweden | 1 |
| Dr. Roland Thaxter, 7 Scott Street, Cambridge, Mass. | 1 |
| Prof. Dr. R. Wettstein, Universität Wien, Vienna | 1 |
| Total | 8 |

## For the Department of Elementary Instruction

Bartlett, Mr. L. Hall, One book for the children's club room library.

Becker, Miss Johanna, One picture—"Pied Piper of Hamlin."

Blatt, Miss Natalie, $1 for the children's club room library.

Butler, Mrs. Glentworth R., Two prize cups competed for by the girls in the outdoor garden.

Butler, Mrs. Glentworth R., Two jardiniers for the children's club room.

Cabot, Dr. Irving, Money for the children's club room library.

Clark, Miss Kathryn P., One book for the children's club room library.

Crapser, Miss Eunice E., Two silhouettes for the children's club room.

Driggs, Miss Alice, One book for the child who showed the greatest interest in flowers in the outdoor garden.

Fairchild, Mr. Frank K., Specimens of ferns for class use.

Flatbush Garden League (through Mrs. E. L. Carson), Prize books for the greatest improvement made by a first year child in the outdoor garden.

Folger, Mr. H. C., One set (ten volumes) of Shakespeare for the children's garden library.

Foster, Mrs. Olive Hyde, One book for the children's club room library.

Francis, Mrs. Lewis W., $5 for books for the children's club room library.

Gager, Mrs. C. Stuart, One book for the children's club room library.

Gager, Dr. C. Stuart, One book for the children's club room library.

Gager, Miss Prudence, One book for the children's club room library.

Garden Teachers' Association, One prize cup competed for by the boys in the outdoor garden.

Kunreuther, Mrs. Benjamin, Six vases for prizes for the children's work.

Matteo, Frank, $.50 for the children's work.

Maxwell Training school for Teachers, $5 for books for the children's club room library.

Mothers' Club, Public School 123, $10 for the children's work.

Peirce, Mrs. Emma, One book for the children's club room library.

Schubert, Miss Bernice, $1 for book for the children's club room library.

Shaw, Miss Agnes, One book for the children's garden library.

Shaw, Miss Ellen Eddy, One book for the children's club room library.

Shaw, Miss Ellen Eddy, Two gold honor pins for honorable service in the outdoor garden.

Simpson, Miss Ray, One book for the children's club room library.

Sutcliffe, Miss Alys, One book for the children's garden library.

Waldes, Mrs. Ica, One book for the children's club room library.

Waldes, Mrs. Ica, One wooden plaque for the children's garden house.

White, Miss Harriet H., $100 to be used in connection with the work of the Department of Elementary Instruction.

## APPENDIX 2

## PUBLICATIONS OF MEMEBERS OF STAFF DURING 1928

**Bartlett, Kathryn Clark**

—— Syllabus on Sugar. *Brooklyn Botanic Garden.* March.

—— List of children's garden books. *Harper's Monthly Broadside.* April.

**Benedict, Ralph C.**

—— The Ransiers' Trip. *Amer. Fern Jour.* **18**: 26–27. January–March.

—— Activities of the British Pteridological Society. *Amer. Fern Jour.* **18**: 27–28. January–March.

—— What Luck Have You had in Naturalizing Hart's Tongue Plants? *Amer. Fern Jour.* **18**: 99–100. July–September.

—— The First New York Orchid Show. *Amer. Fern Jour.* **18**: 100. July–September.

—— Under What Conditions does Dryopteris dilata grow? *Amer. Fern Jour.* **18**: 130–132. October–December.

—— Are Biology Teachers Biologists? *Bull. Assoc. New York Biology Teachers.* December.

**Free, Montague**

—— Hardy Chrysanthemums. *Brooklyn Bot. Gard. Leaflets* **XVI**$^{8-9}$. October.

—— Seventeenth Annual Report of the Brooklyn Botanic Garden. Report of the Horticulturist. *Brooklyn Bot. Gard. Rec.* **17**: 83–89. April.

**Gager, C. Stuart**

—— Wellesley College and the Development of Botanical Education in America. *Science* **67**: 171–178. Feb. 17.

—— Seventeenth Annual Report of the Brooklyn Botanic Garden, 1927. Report of the Director. *Brooklyn Bot. Gard. Rec.* **17**: 15–41. April.

—— The Evolution of the Plants. Chapter in *Creation by Evolution.* (Edited by Frances Mason.) Pp. 137–155. New York. The Macmillan Co.

—— Various abstracts in *Biological Abstracts.*

**Graves, Arthur Harmount**

—— Report of work in forest pathology for 1927. *Brooklyn Bot. Gard. Rec.* **17**: 49–52. April.

—— Report of the Curator of Public Instruction for 1927. *Brooklyn Bot. Gard. Rec.* **17**: 60–69. April.

—— Abstract of discussion on "The place of city forests, botanical gardens, zoological gardens, museums, and other special aids to recreation," at the Fifteenth Recreation Congress, Atlantic City, N. J. October 4, 1928, *Playground Magazine.* November.

—— Practical suggestions for the growing of Christmas greens. *Brooklyn Bot. Gard. Leaflets* **XVI**$^{10-11}$: 1–8. December.

—— 51 newspaper articles relating to the Brooklyn Botanic Garden.

—— 12 abstracts of botanical books and papers in *Biological Abstracts.* Vols. 1 & 2, 1927–1928.

**Gundersen, Alfred**

—— Delectus Seminum. (1928 Seed list.) *Brooklyn Bot. Gard. Rec.* **17**: January (with M. Free).

—— The story of plant evolution. *Brooklyn Bot. Gard. Leaflets* **XVI**$^{1-4}$. April.

—— International Seed Exchange Communication No. 9. April (with C. S. Gager).

—— Flower structures of dicotyledons. *Torreya* **28**: 70–72. August.

—— Various abstracts for *Biological Abstracts.*

**Reed, George M.**

—— Physiologic races of bunt of wheat. *Amer. Jour. Bot.* **15**: 157–170. February.

—— Beardless iris project. *Brooklyn Bot. Gard. Rec.* **17**: 53–56. April.

—— Beardless iris trial garden at the Brooklyn Botanic Garden. *Bull. Amer. Iris Soc.* **27**: 16–19. April.

—— Plant pathology. *Brooklyn Bot. Gard. Rec.* **17**: 43–49. April.

—— The inheritance of resistance of oat hybrids to loose and covered smut. *Ann. N. Y. Acad. Sci.* **30**: 129–176. May.

—— Physiologic races and the inheritance of resistance in the cereal smuts. *Torreya* **28**: 62–64. May–June.

—— The Japanese iris. *Bull. Amer. Iris. Soc.* **28**: 40–50. July.

—— Japanese and Siberian irises. *Jour. N. Y. Bot. Gard.* **29**: 235–238. September.

**Shaw, Ellen Eddy**

—— Children's Gardens: play and work. *The Playground* **21**: 11. February.

—— Planting penny packets of seeds. *Nature Garden Guide* **7**: 5. March.

—— Circulars of information for distribution at Flower Show Exhibit in March, as follows: Children's Classes, The Children's Garden, Flower Panels from the Children's Club Room.

—— Report of the Curator of Elementary Instruction. *Brooklyn Bot. Gard. Rec.* **17**: 71–76. April.

—— An old-fashioned garden. Beaumont (Texas) *Journal.* April 16.

—— Gardening and plant study. *Child Study* 7–8. May.

—— Little gardens for Girl Scout little houses. *The Girl Scout Leader: Supplement.* May.

—— The Brooklyn Botanic Garden. *Black and Gold Beetle* **1**: 3. June.

—— A survey of work from 1913 to 1928. *Brooklyn Bot. Gard. Leaflets* **XVI**$^{5-7}$. June.

—— The following articles appeared in the *American Home* as indicated:

First steps in gardening. October.
Rooting cuttings in the house. November.
Plants for Christmas time and after. December.

—— The following articles appeared in the *New York Sun* on the dates indicated:

What to plant and how to plant. February 17.
The garden soil. February 24.
Take your pencil in hand. March 2.
Planning the garden. March 9.
Color schemes for the garden. March 16.
Starting seeds indoors. March 23.
House plants. March 30.
Planting roses. April 6.
Roundabout the garden. April 13.
Garden operations. April 20.
The little backyard garden. May 4.
Planning the flower garden for purposes of picking and interior decoration. May 11.
The children's garden. May 18.
Garden pests. May 25.
Checking up the garden. June 1.
Little hints for the June garden. June 8.
The garden also has its color psychology. June 15.
Vines for the city yard. June 22.
Flower arrangement. June 29.
Color in the garden. July 6.
Checking up the garden. July 13.

Gardening in late July. July 20.
Ordering bulbs for next fall. July 27.
Starting the seed bed. August 3.
Cuttings for everyone. August 10.
A walk around the garden. August 17.
Late August in the garden. August 24.
The outdoor bulb bed. September 7.
Woman's Exposition at the Astor. September 17.
When to act. September 19.
Choosing bulbs for indoor culture. September 21.
Potting bulbs for indoor culture. September 28.
Bulbs for water culture. October 5.
Fall preparation of land. October 19.
Last call in the garden. November 9.
House plants. November 23.
Making a hanging basket. December 7.
Christmas plants. December 21.
Desert gardens. December 24.

**Simpson, Ray**

—— Report of the Librarian for 1927. *Brooklyn Bot. Gard. Rec.* 17 : 90–96. April.

## APPENDIX 3

## TALKS, LECTURES, ADDRESSES, AND PAPERS GIVEN BY MEMBERS OF STAFF DURING 1928

**By the Director of the Garden:**

January 16. *The Brooklyn Botanic Garden.* Broadcasted from Station WLTH.

May 4. *The educational work of the Brooklyn Botanic Garden.* Museum Conference. At the Garden.

November 16. *Effects of radium rays on plants.* Biology Department, Princeton University.

November 19. *The civic value of a botanic garden.* Central Brooklyn Midday Club, Brooklyn.

December 14. *Conservation in the southwestern United States.* New York Bird and Tree Club, New York.

**By the Curator of Elementary Instruction:**

January 11. *Biology as applied to everyday life.* Biology Club of Hunter College, Brooklyn Branch.

January 16. *Botanic trip around the world.* Chatsworth Avenue School, Larchmont, N. Y.

January 18. *Botanic trip around the world.* P. S. 86, Queens.

January 19. *Plant study: its meaning to children.* Mothers' Club, P. S. No. 76.

January 26. *Graduation address.* P. S. No. 96, Queens.

January 27. *Graduation address.* P. S. No. 139.

February 2. *Soil.* Garden Club of Englewood, N. J.

February 7. *Nature study in the life of a child.* Mothers' Club, P. S. No. 99.

February 21. *Nature in everyday life.* James Madison High School Annex.

February 24. *Gardens for boys and girls.* P. S. No. 31, Queens.

March 2. *Penny packets of seed.* P. S. No. 129.

March 13. *Nature study in the child's life.* General Alliance meeting, Liberal Community Church.

March 20. *Nature study and the city child.* Parents' Association, P. S. No. 119.

March 21. *Planting seeds in school.* Teachers of New York City. At the American Museum of Natural History.

March 22. *The small garden.* Block Garden Guild of Long Island.

April 2. *The small garden.* Woman's Club of Englewood, N. J.

April 3. *Children's gardens at the Brooklyn Botanic Garden.* City Gardens Club.

April 17. *Children's work at the Brooklyn Botanic Garden.* P. S. No. 93.

April 18. *Penny packets of seed.* P. S. No. 217.

April 19. *Children's gardens at the Brooklyn Botanic Garden.* Mothers' Club, Model School of Maxwell Training School for Teachers.

April 19. *Penny packets of seed.* P. S. No. 183.

April 23. *Gardening as a recreation.* Parents' Exposition, United Parents' Association, Grand Central Palace.

April 24. *Children's work at the Brooklyn Botanic Garden.* Park Slope Congregational Church.

April 27. *Arbor Day.* P. S. No. 155.

April 30. *Spring nature study.* P. S. No. 185.

May 3. *Children's gardens.* Garden Department of Maplewood Woman's Club.

May 4. *Special phases of our work with children.* Conference of Museum Staffs. At the Garden.

May 16. *Children in relation to science teaching.* Biology Club of Hunter College, Brooklyn Branch.

May 21. *Gardens for children.* Mothers' Club, P. S. No. 193.

May 22. *Gardens.* P. S. No. 43.

May 23. *Nature study.* P. S. No. 181.

May 28. *Brooklyn Botanic Garden.* League of Mothers' Clubs. At the Garden.

June 2. *Nature study for children: children of the city and the country.* Montessori Alumni Association of Children's Education Foundation Training School.

June 15. *Nature study.* P. S. No. 129.

June 26. *Graduation address.* P. S. No. 119.

September 12. *Fall flowers, wild and cultivated.* P. S. No. 181.

September 18. *Nature study in the schools.* Teachers' luncheon conference, P. S. No. 18.

October 15. *The plant world.* P. S. No. 125.

October 17. *Nature study.* P. S. No. 18.

October 24. *Planting of bulbs.* P. S. No. 18.

November 14. *A Thanksgiving long ago.* Students at the Brooklyn Botanic Garden.

November 16. *Children's work at the Brooklyn Botanic Garden.* Woman's Auxiliary of the Brooklyn Botanic Garden. At the Garden.

November 17. *Children's work at the Brooklyn Botanic Garden.* National Recreation School.

November 19. *House plants.* Garden Club of Tenafly, N. J.

December 29. *Children's work at the Brooklyn Botanic Garden.* American Nature Study Society.

December 31. *Activities of the Brooklyn Botanic Garden.* American Nature Study Society meeting.

**By the Curator of Plants:**

October 25. *Four great botanists and their ideas as to plant classification.* Dept. of Botany, Brooklyn Institute. At the Garden.

November 22. *Some comparisons between plant and animal evolution.* Friends of Nature Society, East 84th Street, New York.

December 27. *South American Frankenias.* Systematic section, Botanical Society of America.

**By the Curator of Public Instruction:**

January 16. *Conservation of plants.* Maxwell Training School for Teachers: Annex. Brooklyn.

March 27; April 3, 17, 24; May 22. *The classification of the plant kingdom.* Advanced Biology Class, Maxwell Training School for Teachers. At the Garden.

April 23, 24, 26. *The classification of the plant kingdom.* Review Lectures for Biology Class, College of City of N. Y., Brooklyn Div. At the Garden.

April 25. *Conservation of birds, flowers, and trees.* Boys High School, Waverly Annex. Brooklyn.

May 18. *Conservation.* De Witt Clinton H. S. Annex. Manhattan.

May 24. *Trees of Greater N. Y.* Die Naturfreunde. Brooklyn.

September 17. *Remarks at meeting of Bartlett Associates and Guests.* Stamford, Conn.

October 4. *The work of Botanic Gardens.* In the discussion of the subject, "The place of city forests, botanical gardens, zoological gardens, museums, and other special aids to recreation." Fifteenth Recreation Congress. Atlantic City, New Jersey.

October 5. Summary of the discussion of "The place of city forests, botanical gardens, zoological gardens, museums, and other special aids to recreation." Presented before General Assembly, Fifteenth Recreation Congress, Atlantic City, N. J.

October 9, 22, 29; November 5, 12, 19, 26; December 4, 11. *The classification of the plant kingdom.* Advanced Biology Class, Maxwell Training School for Teachers. At the Garden.

October 15. *Plant diseases.* Garden Club of New Haven.

October 24. *Trees named in the New York City School Tree Study Calendar.* Before School Teachers of New York City. Amer. Mus. of Nat. Hist., New York City.

**By the Curator of Plant Pathology:**

March 13. *Irises.* Stamford (Conn.) Garden Club.

March 28. *Physiologic races and the inheritance of resistance in the cereal smuts.* Torrey Botanical Club. At the Garden.

April 20. *Cereal breeding for smut resistance.* Biology Club, College of the City of New York, Brooklyn Division.

June 2. *Japanese and Siberian irises.* New York Botanical Garden.

June 5. *Irises.* Rye (N. Y.) Garden Club.

November 14. *Sorghum and corn hybrids.* Biology Class, Girls Commercial High School. At the Garden.

November 21. *Irises.* Staten Island Garden Club.

**By the Horticulturist:**

March 8. *English Gardens.* Garden Teachers Association, Brooklyn Botanic Garden.

March 12. *Rock Gardens.* Arundel Hall, Towson, Maryland.

March 19. *Rock Gardens.* Garden Club, Bronxville, N. Y.

March 24. *Bermuda.* The Association of Kew Gardeners in America, Boston, Mass.

June 3. *Rock Gardens.* Sunnyside Garden Club. At the Garden.

July 12. *English Gardens.* Sayville Garden Club, Sayville, L. I.

July 24. *House Plants.* The Ramapo Garden Club, Suffern, N. Y.

October 8. *English Gardens.* Garden Club of New Rochelle, New Rochelle, N. Y.

**By the Resident Investigator:**

May 31. *A biologist looks into the future.* American Museum of Natural History, New York.

November 22. *New plants from old.* American Museum of Natural History, New York.
December 17. *Agriculture.* Haaren High School, New York.

**By the Registrar and Custodian:**

December 21. *The use and beauty of trees.* Department of Botany, Brooklyn Institute of Arts and Sciences.

**By Instructors:**

*Mrs. Bartlett:*
April 21. *Gardening for boys and girls.* Parents' Exposition, United Parents' Association, Grand Central Palace.
April 24. *Children's gardens.* P. S. No. 165.
October 8. *Children's gardens.* Garden Club of Wilton, Conn.
November 2. *Flower arrangement.* Fortnightly Library Club of Brooklyn.
*Miss Sargent:*
March 1. *Outdoor gardens.* Mothers' Club, P. S. No. 185.
March 23. *Birds and trees.* P. S. No. 66.
April 2. *Birds and trees.* P. S. No. 169.
April 20. *Spring wild flowers.* P. S. No. 66.
April 25. *Gardening.* P. S. No. 66.
May 20. *Children's garden work.* Miss Mason's School, Tarrytown, N. Y.
October 22. *Trees.* P. S. No. 125.
October 30. *What the Brooklyn Botanic Garden offers to boys and girls.* Federation of Boys' and Girls' Clubs, Brooklyn Chamber of Commerce.
October 31. *Forestry.* P. S. No. 66.
November 5. *Bulbs.* P. S. No. 69.
November 7. *Children's work at the Brooklyn Botanic Garden.* Central Congregational Church.
November 12. *Children's work at the Brooklyn Botanic Garden.* Mothers' Club, P. S. No. 193.

A TOTAL of 115 talks, lectures, addresses, and papers have been given by members of the staff during 1928.

# APPENDIX 4

## REPORT ON BROOKLYN BOTANIC GARDEN PUBLICATIONS, 1928

### *American Journal of Botany*

Published monthly in cooperation with the Botanical Society of America. Volume XV (1928) comprised ten issues as usual (omitting August and September) with 54 papers, 650 pages, 47 plates, and 117 text figures included. There was a Supplement comprising "Abstracts of papers presented before the Physiological Section of the Botanical Society of America, New York, N. Y., December 27–29, 1928." The cost of publishing and distributing the Supplement was met by the Physiological Section, and separate reprints were distributed to its members in advance of the New York meeting. Eight papers (as against four in 1927) were published on the "author-payment" plan, according to which, if the author or his institution defrays the entire cost, the paper is published in the next issue to go to press after editorial acceptance. All such papers are placed after the papers published in the order received and at the expense of the Journal. Dr. E. W. Sinnott, formerly of Connecticut Agricultural College but since September 1, 1928, of Columbia University, continued as Editor-in-Chief, and Dr. Arthur Harmount Graves continued as the Brooklyn Botanic Garden representative on the editorial board. The circulation of this Journal, as of November 30, 1928 (the close of its fiscal year) was 1,448, and the annual budget $12,454.73. Volume XV was dedicated to Frederick Charles Newcombe (1858–1927), who was one of those most active in securing the establishment of the Journal, and who was its first Editor-in-Chief, continuing in that capacity from 1914 to 1917, inclusive.

### *Ecology*

Published in cooperation with the Ecological Society of America. The four issues of Volume IX (1928) comprised 42 papers (besides reviews and miscellaneous matter), 540 pages, 23 plates, and 58 text figures. The circulation at the close of the fiscal year, November 30, 1928, was 1,058, and the annual budget $4,841.16.

### *Genetics*

Published bimonthly in cooperation with the Editorial Board of Genetics. The six numbers of Volume XIII comprised 27 papers and 570 pages, with one colored and 4 black and white plates, one photogravure portrait, and 62 text figures. The circulation at the close of the fiscal year, November 30, 1928, was 605, and the annual budget $6,555.96.

### *Brooklyn Botanic Garden Record*

Volume XVII (1928) of the Record, issued quarterly, comprised 186 pages. The four issues were as follows: January, *Delectus Seminum, 1927;* April, *Annual Report;* July, *Facts about the Brooklyn Botanic Garden;* October, *Prospectus, 1928–9.*

### *Leaflets*

Two single numbers and four double numbers of Series XVI were issued. The circulation (over 1,800, as of December, 1928) tends to increase, and over an ever-widening geographic range, in this and other countries, especially among teachers and libraries.

### *Contributions*

Four numbers (53–56) were issued. Number 54, *The vegetation of Allegany State Park,* by Norman Taylor, was also published by the University of the State of New York as *New York State Museum Handbook 5.*

### *Memoirs*

No Memoir or part was issued in 1928.

### *Research Published*

The total number of research papers published by the Garden during 1928 was 123 occupying over 1,700 pages. In addition, three papers by members of the Garden Staff appeared in periodicals not published by the Garden.

## APPENDIX 5

### FIELD TRIPS CONDUCTED 1928

**By the Curator of Plants:**

April 7. Torrey Botanical Club. Brooklyn Botanic Garden.
May 12. Department of Botany, Brooklyn Institute, Hollis, L. I.
September 23. Torrey Botanical Club, Greenwood Lake, New York, for goldenrods.

**By the Curator of Public Instruction:**

April 29. Torrey Botanical Club. Bay Terrace, Staten Island.
August 26. Torrey Botanical Club. Great Kills, Staten Island.
September 29. Department of Botany, Department of Education, Brooklyn Institute of Arts and Sciences, Great Kills, Staten Island.

## APPENDIX 6

### MEETINGS OF ORGANIZATIONS AT THE GARDEN 1928

March 8. Brooklyn Botanic Garden Teachers Association.
March 26. Woman's Auxiliary of the Brooklyn Botanic Garden.
March 28. Torrey Botanical Club.
April 23. State Federation of Music Clubs.
April 25. Mothers Club, P. S. 81.
April 26. Mothers Club, P. S. 129.
May 2. Women of '76, D. A. R.
May 2. Woman's Benevolent Society of Marcy Ave. Baptist Church.
May 4. Conference of Educational Staffs of Museums of Metropolitan Area.
May 12. League of Neighbors, Union of East & West, etc.
May 28. League of Mothers Clubs, Brooklyn, N. Y.
June 1. American Iris Society.
June 2. Children of the American Revolution, Gen. Lord Stirling Society.
June 3. Sunnyside Garden Club.

June 7. New York Bird & Tree Club.
June 13. Mothers Club, P. S. 108.
June 13. Mothers Club, P. S. 99.
June 27. New York Horticultural Society.
October 18. National Nature Study Association.
October 25. Department of Botany, Brooklyn Institute of Arts & Sciences.
November 16. Woman's Auxiliary of the Brooklyn Botanic Garden.
December 30. American Nature Study Society of New York City.

| | |
|---|---|
| Number of Organizations | 22 |
| Total attendance | 1,637 |

## APPENDIX 7

### REPORT ON PHOTOGRAPHIC WORK

| | | |
|---|---|---|
| Negatives on file December 31, 1927 | | 6,400 |
| Negatives accessioned during 1928 | | 200 |
| Total negatives on file December 31, 1928 | | 6,600 |
| Lantern slides on file December 31, 1927 | | 4,900 |
| Lantern slides accessioned during 1928 | | 220 |
| Total lantern slides on file December 31, 1928 | | 5,120 |
| Prints on file December 31, 1927 | | 2,776 |
| Prints made during 1928 | 1,075 | |
| Used or distributed | 875 | |
| Prints filed during 1928 | | 200 |
| Total prints on file December 31, 1928 | | 2,976 |
| Enlargements made | | 79 |

Respectfully submitted,

Frank Stoll,
*Registrar.*

## OFFICERS OF THE BOARD OF TRUSTEES

Honorary President

FRANK L. BABBOTT

President
EDWARD C. BLUM

| First Vice-President | Second Vice-President |
|---|---|
| WALTER H. CRITTENDEN | WILLIAM A. PUTNAM |

Third Vice-President
ADRIAN VAN SINDEREN

| Treasurer | Secretary |
|---|---|
| G. FOSTER SMITH | JOHN H. DENBIGH |

### BOTANIC GARDEN GOVERNING COMMITTEE

MISS HILDA LOINES, Chairman

EDWARD C. BLUM, *Ex officio*
MRS. WILLIAM H. CARY
WALTER H. CRITTENDEN
GATES D. FAHNESTOCK
MRS. LEWIS W. FRANCIS
JOHN W. FROTHINGHAM
EDWIN GOULD
WILLIAM T. HUNTER
EDWIN P. MAYNARD
WILLIAM A. PUTNAM
ALEXANDER M. WHITE

### EX OFFICIO MEMBERS OF THE BOARD

THE MAYOR OF THE CITY OF NEW YORK

THE PRESIDENT OF THE BOROUGH OF BROOKLYN

THE COMMISSIONER OF PARKS, BOROUGH OF BROOKLYN

## MEMBERS OF THE BOARD

*(Trustees are Elected from the Life Membership of the Brooklyn Institute of Arts and Sciences)*

Babbott, Frank L.
Bailey, Frank
Beers, E. LeGrand
Benedict, Henry Harper
Blum, Edward C.
Boody, Hon. David A.
Bowker, Richard R.
Cadman, Rev. S. Parkes, D.D.
Cary, Mrs. William H.
* Courtney, William C.
Crane, Judge Frederick E.
Crittenden, Walter H.
Curtin, John J.
Denbigh, Dr. John H.
Dettmer, Hon. Jacob G.
Draper, Mrs. Mary Childs
Fahnestock, Gates D.
Farrell, James A.
Ford, Sumner
Francis, Mrs. Lewis W.
Frazier, Kenneth
Frothingham, John W.
Good, Mrs. William H.
Gould, Edwin

* Deceased, 1928.

Healy, Mrs. A. Augustus
Healy, Henry W.
Hunter, William T.
Jenkins, Alfred W.
Jonas, Ralph
Lewisohn, Adolph
Lockwood, Luke Vincent
Loines, Miss Hilda
Matheson, William J.
Maynard, Edwin P.
McLaughlin, Hon. George V.
Morgan, John Hill
Morse, Horace J.
Post, James H.
Pratt, Mrs. Frederic B.
Pratt, George D.
Putnam, William A.
Smith, G. Foster
Stutzer, Herman
Underwood, John T.
Van Sinderen, Adrian
Warner, Dr. Edwin G.
White, Alexander M.
York, Rt. Rev. Mgr. John C.

## WOMAN'S AUXILIARY

MRS. GLENTWORTH R. BUTLER, CHAIRMAN

Babbott, Mrs. Frank L., Jr.
Bailey, Mrs. Frank
Baldwin, Mrs. Wm. H.
Blum, Mrs. Edward Charles
Boardman, Mrs. George
Braman, Miss Emily L.
Braman, Miss Irene M.
Brewster, Mrs. Walter Shaw
Brinsmade, Miss Alice
Brower, Mrs. George E.
Brown, Mrs. G. Stewart
Cabot, Mrs. Irving L.
Carpenter, Mrs. James O.
Cary, Mrs. William H.
Childs, Mrs. William H.
Coutts, Miss Frances H.
Cranford, Mrs. Frederick L.
Cranford, Mrs. Walter V.
Cruikshank, Mrs. Russell V.
Davenport, Mrs. Henry B.
Davenport, Mrs. Henry J.
Delafield, Mrs. John R.
Diller, Mrs. Frank J. W.
Dreier, Mrs. H. Edward
Duncan, Mrs. Cameron
Eastman, Mrs. William F.
Folger, Mrs. Henry C.
Francis, Mrs. Lewis W.
Frank, Mrs. George S.
Frothingham, Mrs. Theodore L.
Gager, Mrs. C. Stuart
Gibb, Mrs. Lewis M.
Good, Mrs. William H.
Goetze, Mrs. Otto
Greenman, Mrs. William B.
Gunnison, Mrs. Herbert F.
Gunnison, Mrs. Raymond M.
Healy, Mrs. A. Augustus
Hills, Mrs. James M.
Hills, Mrs. John
Hooker, Mrs. Samuel C.
Hunter, Mrs. William T.
Hyde, Mrs. Clarence R.
Ingersoll, Mrs. Raymond V.
Ingraham, Mrs. Henry A.
Jameson, Mrs. P. Chalmers
Jameson, Miss Jeanetta C.
Jonas, Mrs. Ralph
Jones, Miss Helen Swift
Knox, Miss Maria
Lathrop, Mrs. John H.
Lay, Mrs. Charles Downing
Leech, Mrs. John E.
Littlejohn, Mrs. Thos. B.
Lloyd, Mrs. T. Mortimer
Loines, Miss Hilda
Lyman, Mrs. Frank
MacKay, Mrs. Frederick D.
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Marshall, Mrs. William W.

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Maynard, Mrs. Edwin P., Jr.
Morse, Miss Alice L.
Noble, Mrs. Francis L.
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Paris, Mrs. John Walton
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Peters, Mrs. Wm. Sterling
Pierrepont, Miss Julia J.
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Potts, Mrs. Charles E.
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Pratt, Mrs. Richardson
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Putnam, Mrs. William A.
Roberts, Mrs. Dudley
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Smith, Mrs. B. Herbert
Stewart, Mrs. Seth Thayer
Stoughton, Miss Elizabeth C.
Stutzer, Miss Elise W.
Stutzer, Mrs. Herman
Sutphin, Mrs. Joseph H.
Swan, Mrs. Eugene L.
Truslow, Mrs. Walter
Underwood, Mrs. John T.
Van Brunt, Mrs. Jeremiah R.
Van Sinderen, Mrs. Adrian
Warren, Mrs. Luther
White, Mrs. Alexander M.
White, Miss Harriet H.
Woodward, Miss Mary Blackburne
Young, Mrs. Richard, Jr.

## LIST OF MEMBERS

(*Revised to February 21, 1929*)

For information concerning the various classes of membership consult page 149, at the end of this Report

### BENEFACTORS

*By contribution of $100,000 or more, or by gifts of equivalent value*

*Samuel P. Avery
*Augustus Graham
*A. Augustus Healy
*Carl H. de Silver
*Alfred T. White
*Robert B. Woodward

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Frank L. Babbott
*Mary Benson
Edwin Gould
*Edward L. Graef
*Frank S. Jones
*Alfred Duane Pell
*Mrs. Caroline H. Polhemus
William A. Putnam
*Charles A. Schieren
John T. Underwood
*Alfred T. White
Miss Frances E. White
Miss Harriet H. White

*Deceased.

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*By contribution of $10,000 or more, or by gifts of equivalent value*

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* Henry P. Martin
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* Mrs. Caroline H. Polhemus
George D. Pratt
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* Henry K. Sheldon
Mrs. Lydia Babbott Stokes
Herman Stutzer
John T. Underwood

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* Avery, Samuel P.
Babbott, Frank L.
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Barnes, Mrs. Richard S.
Barr, Mrs. Thos. T.
Beers, E. LeGrand
Beers, Miss M. Elizabeth
* Beers, Mrs. Mary L.
Beers, Dr. Nathan T.
Benedict, Henry Harper
* Benson, Miss Mary
* Blackford, Mrs. Eugene G.
Blum, Edward C.
Boocock, Murray
Boody, Hon. David A.
* Brackett, Miss Mary A.
Brown, Mrs. Lilla
Campbell, Miss Mary
Coffin, Mrs. Sturgis
Cooke, Henry F.
Day, Mrs. Emily L.
* Dutcher, Mrs. Helvetia B.
English, Mrs. J. Radford
* Evans, Miss Mabel Louise
Fahys, George E.
* Fahys, Joseph
First Unitarian Church Society
Freifeld, Mrs. George
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Good, Mrs. John, Sr.
* Gottsberger, Francis
* Graef, Edward L.
* Healy, A. Augustus
* Healy, Frank
* Hearn, Mrs. George A.
Hentz, Henry
Herriman, Miss Helen
Higgins, Charles M.
* Hoagland, Mrs. Jos. C.
* Hoagland, Joseph C.
Hoagland, Raymond
Hoagland, Miss S. W.
Hodenpyl, Eugene, Jr.
How, Miss Susan B.
Hoyt, Mrs. Mark

*James, John S.
*Jones, Frank S.
*Jones, Mary L.
*Jones, Townsend
*Joost, Martin
*Lawrence, Henry C.
Lawrence, Lysander W.
Lawrence, Richard H.
*Loeser, Frederick
*Lord, Mrs. John Bradley
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McMahon, Jos. T.
MacDonald, Mrs. Ian
Maxwell, J. Rogers, Jr.
Morse, Horace J.
Oakley, Mrs. Theodora L.
Olcott, George M.
*Palmer, Lowell M.
Peabody, George Foster
*Pell, Rev. Alfred Duane
Pell, Mrs. Cornelia L.
Post, James H.
Powell, Mrs. Robert E.
Pratt, George D.
Putnam, William A.
Sanger, William
*Sanger, William Cary
*Schieren, Charles A.
Seamans, Miss Dorothy
*Sheldon, Mrs. Henry K.
Simonds, Mrs. William R.
Smith, Mrs. Annie Morrill
Smith, Howard C.
Stutzer, Herman
Underwood, John T.
Vander Weyde, Mrs. N. J.
Walsh, Mrs. Anna F.
Webster, Mrs. Mary L.
White, Alexander M.
*White, Alfred T.
White, Miss Frances E.
White, Miss Harriet H.
*Woodward, Mrs. John B.
*Woodward, Col. Robert B.

## Life Members

*By contribution of $500 or more, or by gifts of equivalent value*

### Through the Botanic Garden

Atkins, Frederick L.
Babbott, Frank L.
Bailey, Frank
Bobbink, Lambertus C.
Butler, Mrs. Glentworth R. (In memory of Dr. Glentworth R. Butler.)
Cary, Mrs. William H.
Childs, Eversley
Engelhardt, George P.
Frothingham, Miss Elisabeth W.
Frothingham, John W.
Gould, Edwin
Hicks, Henry
Hunter, William T.
Jonas, Ralph
Loines, Miss Hilda
Osman, Fred D.
Potts, Maj. Charles E.
Pratt, Charles M.
Smith, Mrs. Annie Morrill
Southwick, Dr. E. B.
Thatcher, Edwin H.

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Adams, Mrs. Edward
Ager, John Winifred
Albertson, Rev. Charles Carroll, D.D.
Allan, Mrs. Mansfield
Allen, Miss Mary W.
Anderson, Mrs. John
Andrews, William A.
Ayers, Dr. H. Messenger

Babbott, Dr. Frank L., Jr.
Banbury, James J.
Bannister, Miss Eleanor C.
Batterman, Charles H.
Batterman, Henry L.
Batterman, Miss Minnie P.
Baxter, F. W.
Baylis, A. B.
Baylis, Wm., Jr.
Bigelow, Edward F.
Blumenthal, Maurice
Blydenburgh, Frank J.
Bolwell, Mrs. Sarah A.
Boody, Alvin
Bouck, James B.
Bowker, Richard R.
Bramm, Miss Elizabeth
Brasher, Philip
Brasher, Reginald R.
Brockway, Miss Emma A.
Brown, Miss A. W.
Brown, John W.
Buckley, Charles R.
Buckley, John D.
Buek, Mrs. Cecilia
Burnham, Dr. Clark
Cadman, Rev. S. Parkes, D.D.
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Cary, Miss Alice B.
Chapel, William L.
Chapman, Miss Leila H.
Chapman, Mrs. Leila T.
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Chittenden, Miss Alice H.
Claflin, John
Clarke, Rev. L. Mason
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* Courtney, William C.
Crane, Judge Frederick E.
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Crowell, Mrs. Jeremiah
Cullen, Miss Margaret M.
Cunningham, Mrs. F. W.
Curtin, John J.
Curtis, Henry S.
Dalby, Archibald B.
Davenport, Hon. William B.
Davenport, Mrs. William B.
Davis, William T.
De Motte, G. J.
Denbigh, Dr. John H.
Dennis, Dr. Frederic S.
Dennis, Mrs. Frederic S.
Dettmer, Hon. Jacob G.
Dick, J. Henry
Dixon, Theodore P.
Dodge, Miss S. Ross
Dougherty, Andrew, Jr.
Draper, Ernest G.
Draper, Mrs. Mary Childs
Dreier, Theodore
Dykeman, Conrad V.
Eastman, Mrs. William F.
Eger, Mrs. Theodore G.
Elmhirst, Mrs. Dorothy P. Whitney
English, George L.
Evans, Mrs. Gertrude C.
Fahnestock, Gates D.
Fara Forni, Mme. A. F.
Farmer, Walter B.
Farrell, James A.
Farrier, Albert Moses
Farrier, Frederick B.
Ferrier, Miss Elizabeth A.
Field, Miss Elizabeth
Fish, Mrs. Ivy Chapel
Flagg, Mrs. T. Benson
Flinsch, Rudolph E. F.
Foote, Alfred Sherman
Ford, Sumner
Francis, Mrs. Lewis W.
Frank, Mrs. George S.
Franken-Sierstorpff, Countess von
Frazier, Kenneth
Frothingham, Miss Elisabeth W.
Frothingham, Miss Helen H.
Frothingham, John W.
Gibb, William T.
Gifford, Ira L.
Gilbert, Miss A. Louise M.

Gilbert, William T.
Good, Mrs. John, Jr.
Good, Mrs. William H.
Goodnow, David F.
Goodnow, Prof. Frank J.
Goodnow, Henry A.
Goodnow, Weston W.
Grace Church (Brooklyn)
Hall, Charles H.
Halsey, William B.
Ham, Miss Dorothy B.
Harriman, Mrs. E. H.
Healy, Mrs. A. Augustus
Healy, Henry W.
Heckscher, August
Hester, Mrs. Ada Gibb
Hicks, Henry
Hill, William B.
Hoagland, Miss Anna M.
Hollenback, Miss Amelia B.
Hooker, D.
Hooper, Mrs. Franklin W.
Hornaday, William T.
Horsman, Edward I.
Howell, Hampton
Hubbell, Rev. William S.
Huber, Joseph
Hudson, Mrs. Laura K.
Hulbert, Mrs. Henry C.
Hulst, Mrs. M. H. S.
Husson, Miss C. Julie
Hyde, Henry St. John
Hyde, James H.
Ingraham, Miss Frances
Ingraham, George S.
Jeffrey, Dr. Stewart L.
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Jennings, Walter
Johnson, Alvan R.
Jones, Miss Emily W.
Joost, Mrs. Martin
Kahn, Mrs. Otto
Kelekian, Dikran G.
Kellogg, Dwight H.
Kennedy, Mrs. Mary A.
Kenyon, Mrs. Irene S.
Kenyon, Whitman W.
Kunz, Dr. George F.
Ladd, Mrs. Mary Babbott
Lamb, Col. Albert E.
Lang, Mrs. Robert
Latimer, Miss Julia W.
Lewis, Mrs. August
Lewisohn, Adolph
Lincoln, Mrs. Dorothy Chapel
Litchfield, E. Hubert
Litchfield, Edward H., Jr.
Litchfield, Edward H., Sr.
Littlejohn, Mrs. Thos. B.
Lockwood, Luke Vincent
* Loeser, Charles
* Loeser, Gustav
Love, Mrs. Henry D.
Low, Ethelbert Ide
Low, Josiah O.
Ludlum, Clinton W.
Lyman, Frank
Lynde, Mrs. Martha R.
McAneny, Hon. George
McConnell, Rev. S. D.
* McDonald, Rev. Robert
McKay, Mrs. John S.
McLaughlin, Hon. George V.
Macbeth, Robert W.
Marshall, William W.
Mason, William P.
Matheson, William J.
Mathews, Mrs. Albert H.
Maxwell, Henry L.
Maynard, Edwin P.
Mead, W. S. M.
Melish, Rev. John H.
Mercer, Rev. Arthur
Moffat, David
Moffat, William L., Jr.
Moore, Mrs. W. H.
Morgan, James L.
Morgan, John Hill
Morse, Miss Alice L.
Morse, Charles L.
Mundhenk, Herman
Nichols, William H.

Nostrand, P. Elbert
O'Connor, Mrs. W. B.
Ogilvie, Donald Manson
Olcott, Miss Martha W.
Orr, Miss Mary Moore
Packard, Miss Mary S.
Palmer, Henry L.
Parker, Asa W., Jr.
Parker, Gordon
Peet, Mrs. Louise H.
Pierrepont, John J.
Pierrepont, Seth Low
Polhemus, Miss R. A.
Potts, Maj. Charles E.
Pratt, Mrs. Frederic B.
Pratt, Frederic B.
Pratt, Harold I.
Prentice, James Howard
Prentiss, Russell E.
Prosser, Thomas
Prosser, Thomas Harold
Prosser, Walter R.
Putnam, Harrington
Putnam, Mrs. William A.
Ramsay, Dick S.
Ramsdell, Mrs. F. Van N.
Robinson, George C.
Robinson, Dr. Nathaniel
Ruger, Mrs. Adolph
Ruland, Irving A.
Ruscoe, Miss Rose
Russell, Rev. James T.
Russell, James T., Jr.
Russell, Mrs. Talcott H.
Sackett, Charles A.
Sanbern, Mrs. Frank H.
Sanger, Miss Lillian
Schenck, Miss Eunice M.
Schieren, Harrie Victor
Sheldon, Mrs. Anna B.
Sheldon, Henry
Slack, Mrs. Julia G.
Smith, G. Foster
Smith, Mrs. Katherine L.
Smith, Theo. E.
Snow, Helmer
Squier, Frank
Stevens, Mrs. Roy G.
Stevens, Shepherd
Stewart, Douglas MacC.
Stokes, Mrs. S. Emlen
Sullivan, Andrew T.
Taylor, Miss Bessie
Taylor, Mrs. Helen S.
Taylor, William H.
Thayer, Mrs. Anna K.
Tiffany, Louis C.
Tucker, Mrs. George S., Jr.
Turner, Mrs. Bertha C.
Tuthill, Miss Isabel H.
Valentine, P. A.
Van Anden, Miss Susan M.
Van Nostrand, Mrs. John B.
Van Sinderen, Mrs. Adrian
Van Sinderen, Adrian
Van Wyck, Richard
Wagner, Miss Marie
Walbridge, Robert R.
Warbasse, Mrs. James P.
Ward, Miss Helen
Warner, Dr. Edwin G.
Weber, Mrs. Herman C.
Webster, Mrs. Edward H.
White, Harold T.
White, S. V.
Whitney, Sumner B.
Wisner, Mrs. Horatio S.
Woodward, Miss Mary B.
York, Rt. Rev. Mgr. John C.
Young, Hon. Richard
Zabriskie, Mrs. Cornelius
Ziegler, Mrs. William

## SUSTAINING MEMBERS [1]

*By payment of $25 annually*

Anderson, John (G)
Babbott, Dr. Frank L., Jr. (M)
Baker, Joseph J. (M)
Boissevain, Robert (G)
Brooks, Mrs. Edward B. (G)
Bush, Irving T. (M)
Campbell, Miss Mary (M)
Case, Miss Marian Roby (G)
Crampton, Mrs. Edwin H. (G)
Doscher, Mrs. Alice B. (M)
Dreier, Miss Katherine S. (M)
Edwards, Mrs. Wm. Seymour (M)
Emerson, Mrs. William (G)
Enequist, John (G)
Faber, Lee W. (M)
Field, Mrs. W. D. C. (M)
*Ford, James B. (G)
Foster, Charles L. (M)
Froeb, Charles (M)
Frothingham, John W. (M)
Frothingham, Mrs. John S. (M)
Good, Mrs. William H. (M)
Graves, Robert N. (M)
Greenberg, Morris (M)
Havemeyer, T. A. (G)
Hicks, Henry (E)
Hottinger, Henry (G)
Ingraham, Edward A. (G)
Ingraham, Mrs. Henry C. M. (G)
Jacobs, Mrs. Henry M. (G)
Jackson, F. W. (M)
Jenkins, Mrs. John Sloane (M)
Kirkman, Mrs. A. S. (M)
Lambert, Frank (M)
Latimer, Miss Mary (G)
Lawrence, L. W. (G)
Leech, Mrs. John E. (G)
Logan, William J. (E)
Loomis, Guy (M)
Louria, Dr. Henry W. (M)
Low, Mrs. Chauncey E. (M)
Low, William G. (M)
Luther, Mrs. George Martin (G)
MacLean, Mrs. Peter A. (G)
Merritt, Mrs. James H. (G)
Morrow, Mrs. Thomas I. (G)
Morton, Dr. L. J. (M)
Notman, George (G)
Perkins, Mrs. Grace Pullman (E)
Pierrepont, Miss Julia J. (M)
Pinkerton, Mrs. Robert A. (E)
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Reimer, Miss Margareth B. (M)
Righter, Miss Jessie H. (M)
Rossin, Alfred S. (M)
Rothschild, Simon F. (G)
Rouss, Peter W. (E)
Scott, Dr. Peter (E)
See, Alonzo B. (M and G)
Somers, Harold (M)
Squibb, Dr. Edward H. (E and M)
Sutphin, Mrs. Joseph H. (M)
Uhrbrock, Mrs. E. F. (G)
Underwood, Mrs. John T. (M)
White, Alexander M. (G)
Wood, Miss Emily S. (E)
Zabriskie, Mrs. Cornelius (G)

## BROOKLYN BOTANIC GARDEN ANNUAL MEMBERS

*By payment of $10 annually*

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Adams, Henry S.
Almirall, Mrs. Juan A.
Anderson, Mrs. John

---

[1] (G), Through the Botanic Garden; (M), Museum; (E), Educational Department.

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Ant, Dr. Morris
Atkins, Miss Annie G.
Atkinson, Mrs. J. H. G.
Augur, W. A.
Avery, Walter
Babcock, Mrs. Edwin G.
Bailey, Mrs. A. W.
Bailey, Mrs. Frank
Ballin, Mrs. Rose L.
Bangs, C. Roy
Banker, John F.
Barish, Miss M.
Barnes, Mrs. Edith C.
Baron, Mrs. Olive H. G.
Bauman, Ben
Beatty, Dr. George Wesley
Beck, Mrs. Anna W.
Becker, Frederick W.
Beers, John Frank
Behr, Edw. A.
Behrisch, Mrs. Gabrial I.
Bennett, Miss Agnes H.
Bennett, Miss Josephine M.
Benson, Mrs. Philip A.
Bernstein, A. N.
Best, Mrs. Alfred M.
Betsch, William G. L.
Betts, Miss Dorothy L.
Betts, Morris
Biezynski, William
Bishop, Mrs. Elizabeth L.
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Blackman, Mrs. Edwin L.
Blackman, Dr. William W.
Blankley, Miss A. Grace
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Bleckman, Elias
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Boardman, Mrs. George M.
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Bossert, John
Bossert, Mrs. L.
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Brewer, Mrs. M. H.
Brewster, Mrs. Walter Shaw
Brinsmade, Miss Alice
Brinton, Mrs. Willard Cope
Britton, Dr. N. L.
Brockway, Mrs. J. E.
Brooke, James J.
Brower, Miss Edith D.
Brown, Mrs. G. Stewart
Browning, Dr. William
Bryan, Mrs. Jane S.
Bryant, Miss Helen W.
Buchanan, Mrs. S. Edwin
Buckley, Jane T.
Burford, Dr. Mortimer G.
Burgess, Miss E. E.
Burkard, Mrs. Anna
Burrell, F. A. M.
Butterick, Miss Mary E.
Cabot, Dr. Irving L.
Cahoone, Mrs. Richard M.
Calder, Hon. William M.
Camp, Miss Caroline D.
Campbell, Miss Mary
Campe, Mrs. Edward von
Canis, Prof. O. P. M.
Carlton, Miss E. D. H.
Carpenter, Mrs. Norman J.
Cary, Mrs. William H.
Casamajor, Mrs. Louise J.
Chaffee, Mrs. D. Dwight
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Chardovoyne, Henry S.
Chauncey, Mrs. George W.
Cisney, Thomas E.
Clancey, Miss Florence
Clark, Dr. Frank H.
Clark, John J.
Clark, Dr. Raymond
Coffin, Mrs. I. Sherwood
Cohen, Morris
Cohn, Dr. Michael A.
Collins, Miss Sarah E.
Combs, Miss Mary H.
Comerford, James J.
Conover, Henry S.
Conroy, Miss Ellen J.

Contemporary Club, The
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Cooper, Thomas H.
Corner, Mrs. Clarence F.
Cranford, Frederick L.
Crawford, Mrs. G. H.
Creamer, William G.
Cruikshank, Russell V.
Cuneo, N.
Curnow, Dr. Dorothea
Dahl, Carl E.
D'Alboro, Dr. John B.
Dana, Mrs. Arnold
Dangler, Mrs. George Jacob
Daniel, Mrs. William W.
Dann, James E.
Darrigrand, Miss Lucie P.
Dauernheim, A. M.
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Davenport, Mrs. Henry J.
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Davis, Mrs. James Sherlock
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deForest, Robert W.
deGolyer, A. G.
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Delatour, Dr. H. Beeckman
De Silver, Mrs. Albert
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* Dickson, David
Dietz, Nicholas
Diller, Mrs. Frank J. W.
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Doody, Mrs. Gertrude M.
Dreier, Mrs. H. Edward
DuBois, Mrs. Henry N.
Dudley, Percy S.
Duncan, Mrs. Cameron
du Pont, Mrs. T. Coleman
Dusseldorf, Mrs. Louis M.
DuVal, Guy
DuVal, Mrs. Guy
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Earle, Mrs. Wm. P., Jr.
Ebinger, Walter D.
Eckstein, Harry
Eldert, Cornelius
Elliott, Mrs. Gilbert
Elm, William von
Elmer, Mrs. Charles W.
Epstein, Milton
Ericson, Carl O.
Ericson, Emanuel
Ericsson, Miss H. Wilhelmina
Etzel, Mrs. Mary M.
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Fairchild, B. T.
Feaster, Dr. Henry J.
Feldstein, Dr. Samuel
Felzmann, Ernest F.
Ferguson, William C.
Figgee, Alexander H.
Fisher, Miss Edna M.
Foster, Miss A. M.
Fraser, Arthur C.
Freedman, Dr. L.
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Gabbe, Mrs. Herman
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Gans, Marion S.
Germain, L.
Gibson, Mrs. Henry S.
Girls' High School
Gladding, Walter M.
Glahn, Mrs. J. Henry von
Goddard, Mrs. Eleanor S.
Goetze, Mrs. Otto
Goldberg, Dr. Jacob M.
Gonnoud, A. J.
Goodman, Joseph
Gotimer, Eugene C.
Gough, Dr. F. A.

Graeber, C. A.
Graham, James S.
Greenberg, Charles
Greenberg, Dr. Sarah K.
Greig, Miss Mary
Greve, William M.
Griffin, Frank E.
Gruhn, Otto
Gunnison, Herbert F.
Gunnison, Mrs. Herbert F.
Gunnison, Mrs. Raymond M.
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Halsted, Mrs. Henry M.
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Harrison, Miss Katharine I.
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Hart, Miss M. L.
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Hawes, Dr. Edward S.
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Heath, Royal V.
Heffley, Norman
Heller, Dr. Jacob
Hengerer, Julius
Hetkin, Henry
Higgins, Dr. Alice K.
Higgins, Charles M.
Higgins, Tracy
Hill, Lester W.
Hills, Mrs. James M.
Hirsch, Dr. John
Hirschberg, Benjamin
Hirschberg, Mrs. Samuel
Hitlin, Dr. Alex
Hogg, Miss Elizabeth
Holcombe, W. P.
Hollenback, Miss Amelia B.
Hollwegs, Miss Katherine
Holmes, Mrs. Edith
Holmes, Miss Grace L.
Hoogland, John W.
Hooker, Mrs. Samuel C.
Hooker, Dr. Samuel C.
Horton, George S.
Howard, Mrs. Wm. F.
Howe, Mrs. Arthur M.
Hubbard, Miss Harriet
Huber, Joseph
Hughes, Mrs. Mary
Hull, Mrs. Charles A.
Hume, Mrs. Henry M.
Hurley, Mrs. Walter E.
Hutton, Miss Sarah E.
Iffla, Miss Florence E.
Ingersoll, Mrs. R. V.
Ingraham, Miss Grace
Ingraham, Henry A.
Ingraham, Miss Mary A.
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## SUMMARY OF MEMBERSHIP

| | | |
|---|---|---|
| Benefactors | | 6 |
| Patrons | | 14 |
| Donors | | 32 |
| Permanent Members | | 90 |
| Life Members | | |
| Through the Botanic Garden | 21 | |
| Through Other Departments | 274 | 295 |
| Sustaining Members | | |
| Through the Botanic Garden | 26 | |
| Through Other Departments | 41 | 67 |
| Annual Members | | 703 |
| Total | | 1,207 |

## INFORMATION CONCERNING MEMBERSHIP

The Brooklyn Institute of Arts and Sciences is organized in three main departments: 1. The Department of Education. 2, The Museums. 3. The Botanic Garden.

Any of the following seven classes of membership may be taken out through the Botanic Garden:

| | | | |
|---|---|---|---|
| 1. Annual member ....... | $ 10 | 5. Donor ................ | $ 10,000 |
| 2. Sustaining member .... | 25 | 6. Patron ................ | 25,000 |
| 3. Life member .......... | 500 | 7. Benefactor ............ | 100,000 |
| 4. Permanent member .... | 2,500 | | |

Sustaining members are annual members with full privileges in Departments one to three. Membership in classes two to seven carries full privileges in Departments one to three.

In addition to opportunities afforded to members of the Botanic Garden for public service through cooperating in its development, and helping to further its aims to advance and diffuse a knowledge and love of plants, to help preserve our native wild flowers, and to afford additional and much needed educational advantages in Brooklyn and Greater New York, members may also enjoy the privileges indicated on the following page.

Further information concerning membership may be had by addressing The Director, Brooklyn Botanic Garden, Brooklyn, N. Y., or by personal conference by appointment. Telephone, 6173 Prospect.

..........................................................

Date ........................

To The Secretary,
Brooklyn Botanic Garden,
1000 Washington Ave., Brooklyn, N. Y.

Dear Sir:

I desire to become

| | | | |
|---|---|---|---|
| An Annual Member ...... | $ 10 | A Donor ................ | $ 10,000 |
| A Sustaining Member ... | 25 | A Patron ................ | 25,000 |
| A Life Member ......... | 500 | A Benefactor ............ | 100,000 |
| A Permanent Member ... | 25,000 | | |

Please find enclosed my check payable to Brooklyn Botanic Garden, and present my name to the Board of the Trustees for election.

Yours truly,

Name .......................................
Address ....................................

## PRIVILEGES OF MEMBERSHIP

1. Free admission to the buildings and grounds at all times.
2. Cards of admission for self and friends to all exhibitions and openings preceding the admission of the general public, and to receptions.
3. Services of docent (by appointment), for self and party, when visiting the Garden.
4. Admission of member and his or her immediate family to all lectures, classes, field trips, and other scientific meetings under Garden auspices, at the Garden or elsewhere.
5. Special lectures and classes for the children of members.
6. Copies of Garden publications, as follows:
    - *a.* Record.
    - *b.* Guides
    - *c.* Leaflets
    - *d.* Contributions
    - *e.* Frequent Announcement Cards concerning plants in flower and other exhibits and events.
7. Privileges of the Library and Herbarium.
8. Expert advice on the choice and care of plants, indoors and out, on planting the home grounds, the care of lawns, and the treatment of plants affected by insect and fungous pests.
9. Identification of botanical specimens.
10. Participation in the periodical distribution of duplicate plant material and seeds, in accordance with special announcements sent to members from time to time.

# FORMS OF BEQUEST TO THE BROOKLYN BOTANIC GARDEN

## Form of Bequest for General Purposes

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.............Dollars, the income from which said sum to be used for the educational and scientific work of the Brooklyn Botanic Garden.

## Form of Bequest for a Curatorship

I hereby give, devise, and bequeath to the Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.............Dollars, as an endowment for a curatorship in the Brooklyn Botanic Garden, the income from which sum to be used each year towards the payment of the salary of a curator in said Botanic Garden, to be known as the (here may be inserted the name of the donor or other person) curatorship.

## Form of Bequest for a Fellowship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of...........Dollars, the income from which sum to be used in the payment of a fellowship for advanced botanical investigation in the Brooklyn Botanic Garden, to be known as the ....................................fellowship.

## Form of Bequest for other particular purposes designated by the testator

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of...........Dollars, to be used (or the income from which to be used) for the Brooklyn Botanic Garden *

..............................................................

..............................................................

* The following additional purposes are suggested for which endowment is needed.

1. Botanical research.
2. Publishing the results of botanical investigations.
3. Popular botanical publication.
4. The endowment of a lectureship, or a lecture course.
5. Botanical illustrations for publications and lectures.
6. The purchase and collecting of plants.
7. The beautifying of the grounds.
8. The purchase of publications for the library.
9. Extending and enriching our work of public education.

## THE BOTANIC GARDEN AND THE CITY

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The Brooklyn Botanic Garden, established in 1910, is a Department of the Brooklyn Institute of Arts and Sciences. It is supported in part by municipal appropriations, and in part by private funds, including income from endowment, membership dues, and special contributions. Its articulation with the City is through the Department of Parks.

The City owns the land devoted to Garden purposes, builds, lights, and heats the buildings, and keeps them in repair, and includes in its annual tax budget an appropriation for other items of maintenance. One third of the cost of the present buildings (about $300,000) was met from private funds.

Appointments to all positions are made by the director of the Garden, with the approval of the Botanic Garden Governing Committee, and all authorized expenditures for maintenance are made in the name of the private organization, from funds advanced by the Institute, which, in turn, is reimbursed from time to time by the City, within the limits, and according to the terms, of the annual appropriation.

All plants have been purchased with private funds since the Garden was established. In addition to this, it has been the practice of the Garden to purchase all books for the library, all specimens for the herbarium, all lantern slides, and numerous other items, and to pay certain salaries, with private funds.

*The urgent needs of the Garden for private funds for all purposes are more than twice as great as the present income from endowment, membership dues, and special contributions.* The director of the Garden will be glad to give full information as to possible uses of such funds to any who may be interested.*

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* A written *Agreement,* dated August 17, 1914, between the City of New York and the Institute, touching the Botanic Garden, published in full in the *Brooklyn Botanic Garden Record,* for April, 1915, amends the agreement of September 9, 1912, which amends the original agreement of September 28, 1909, published in the *Record* for January, 1912.

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## GENERAL INFORMATION

MEMBERSHIP.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, Brooklyn, N. Y.* Telephone, 6173 Prospect.

THE BOTANIC GARDEN is open free to the public daily from 8 a.m. until dark; on Sundays and Holidays open at 10 a.m.

ENTRANCES.—On Flatbush Avenue, near Empire Boulevard (Malbone Street), and near Mt. Prospect Reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Montgomery Street.

TO ASSIST MEMBERS and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one week in advance. No parties of less than six adults will be conducted.

TO REACH THE GARDEN take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, and Tompkins Avenue trolleys to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street and Vanderbilt Avenue trolleys to Prospect Park Plaza and Union Street.

# PUBLICATIONS

## OF THE

# BROOKLYN BOTANIC GARDEN

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly beginning with 1929. Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, announcements of courses of instruction, seed list, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others $1.50 a year. Circulates in 41 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Circulates in 47 countries.

Volume I. *Dedication Papers:* comprising 33 scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. 521 pages. Price $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. Price $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor, June 10, 1927. 151 pages. Price $1.60.

CONTRIBUTIONS. Established, April 1, 1911. Papers originally published in periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume. Circulates in 34 countries.

*52. Inheritance studies in Pisum. VI. Multiple allelomorphism and the inheritance of green and yellow foliage and pod color.* 16 pages. 1927.

*53. Mutation, adaptation to temperature differences, and geographical distribution in plants.* 12 pages. 1928.

*54. The vegetation of the Allegany State Park.* 121 pages. 1928.

*55. Physiologic races of bunt of wheat.* 14 pages. 1928.

*56. The inheritance of resistance of oat hybrids to loose and covered smut.* 48 pages. 1928.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

SEED LIST. (*Delectus Seminum*) Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 143 botanic gardens and institutions located in 42 countries.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in coöperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription, $7.00 a year. Circulates in 48 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $4.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly. Subscription, $6.00 a year. Circulates in 37 countries.

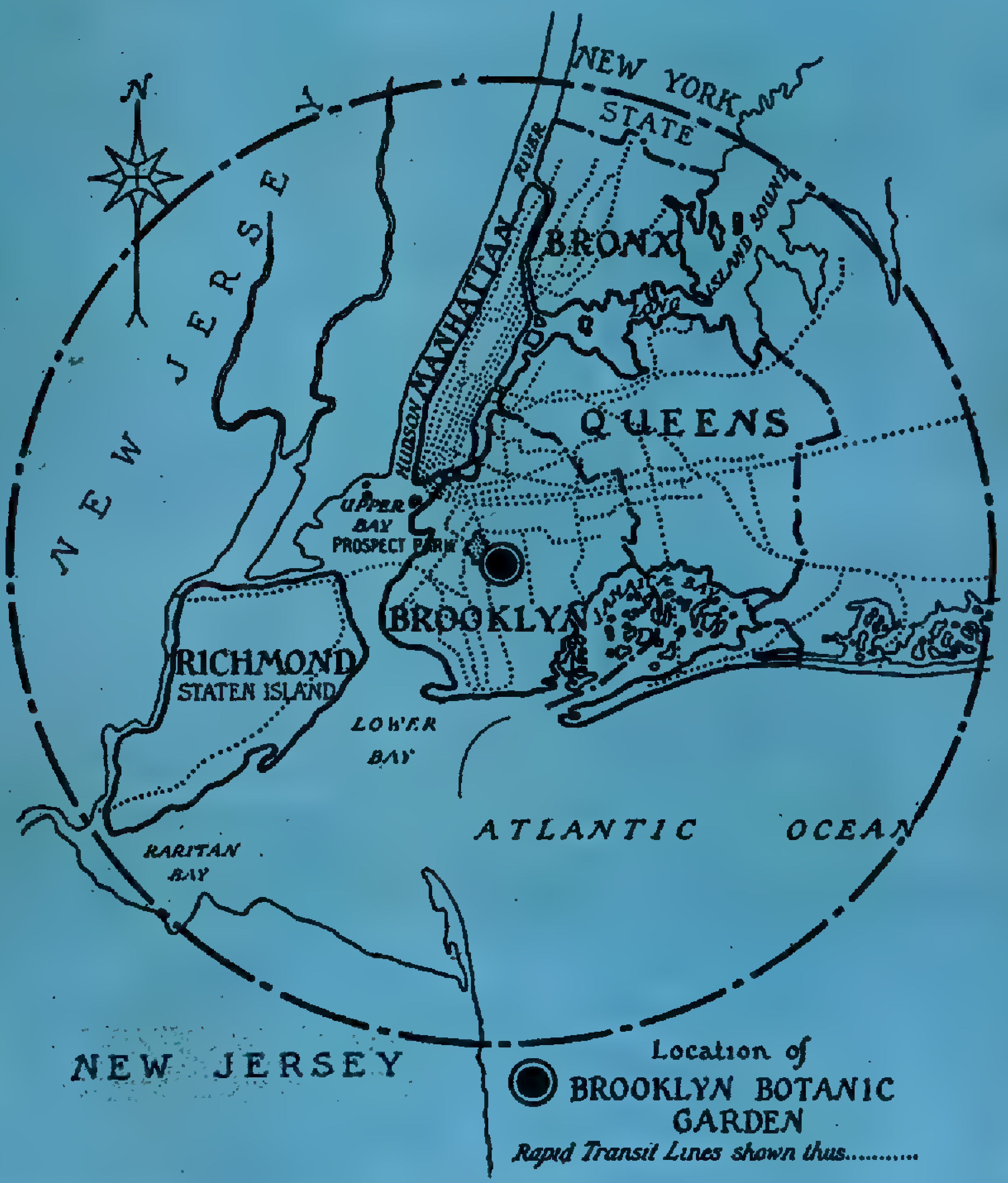
BROOKLYN BOTANIC GARDEN RECORD

VOL. XVIII MAY, 1929 NO. 3

# GARDENS WITHIN A GARDEN

## A GENERAL GUIDE TO THE GROUNDS OF THE BROOKLYN BOTANIC GARDEN

GUIDE NO. 2



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BROOKLYN, N. Y.

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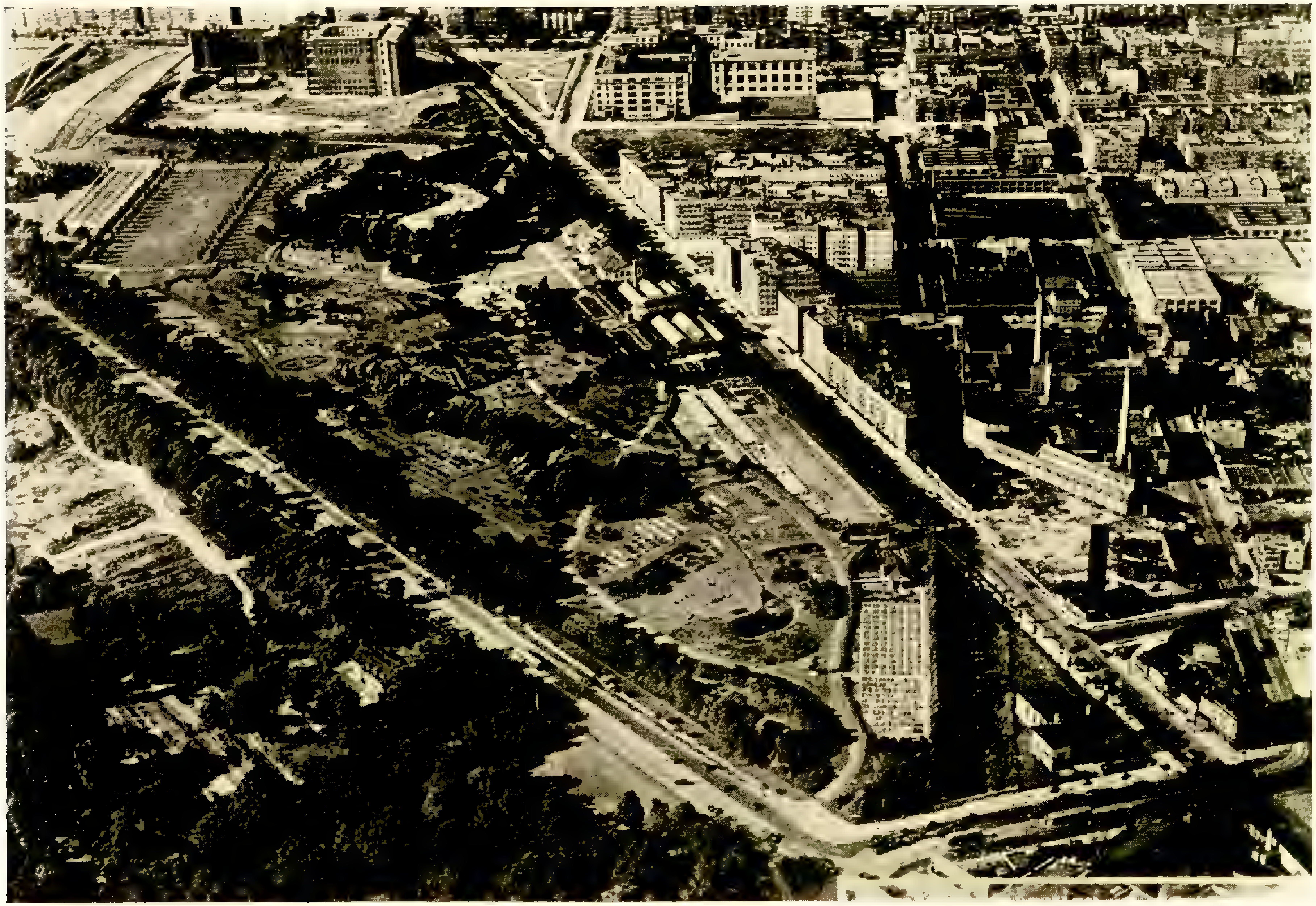

FIG. 1. Airplane view of Brooklyn Botanic Garden. For legend see opposite page (6572).

FIG. 1. Airplane view of Brooklyn Botanic Garden.

*A portion of Prospect Park* is shown in the lower left hand corner, southwest of the Garden.

*Flatbush Avenue* (this portion of it being a parkway) extends between the Park and the Garden, from Empire Boulevard on the south to Grand Army Plaza and Eastern Parkway on the north.

*Washington Avenue* extends along the right hand (east) side of the Garden.

*Empire Boulevard* extends along the south end of the Garden (lower right hand corner of the photograph).

At the corner of Washington Avenue and Empire Boulevard is the Central Fire Alarm Telegraph Station for Brooklyn (not in the Garden area).

At the left of the Fire Alarm building is the cut containing tracks of the Brooklyn Manhattan Transit Co. (B.–M.T.)

*The Children's Garden* (the light-colored area at the left of the railroad cut) shows the individual beds, with the Children's Building at the upper end and the Shakespeare Garden at the lower end.

*The Experimental Garden* along Washington Ave., is just north of the Children's Garden.

*The Conservatories and Laboratory Building* are on Washington Ave., just north of the Experimental Garden.

*The Lake* may be seen north of the Laboratory Building, and north of the Lake the Brooklyn Museum Building (unfinished), at the corner of Washington Ave., and Eastern Parkway. The Museum site is not included in the Botanic Garden area.

*The Horticultural Section* (in the early stages of its development in 1929) is at the left (west) of the Museum Building. The dark strip is a freshly plowed area.

*A corner of Mt. Prospect Reservoir* is shown at the extreme upper left hand corner of the photograph.

*The Esplanade* is the dark rectangular area south of the Museum site.

*The Rose Garden* occupies the smaller and light-colored rectangular area west (at the left) of the Esplanade.

*The Native Wild Flower Garden* is not shown in the photograph. It lies northwest of the Rose Garden and south of the Reservoir.

*The Systematic Section* occupies the most of the area between the Children's Garden and the Esplanade.

*The Rock Garden and Ecological Garden* are west of the Systematic Section, about midway between Empire Boulevard and the Esplanade.

BROOKLYN BOTANIC GARDEN RECORD

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# GARDENS WITHIN A GARDEN[1]

## A GENERAL GUIDE TO THE GROUNDS OF THE BROOKLYN BOTANIC GARDEN[2]

By C. Stuart Gager, *Director*

### Introduction

**Gardens within a Garden** tersely and appropriately describes the Brooklyn Botanic Garden, and in fact many botanic gardens, for such institutions commonly comprise, not one planting unit, but several. Possibly it is the realization of this which makes it (apparently) so natural for people to refer to a botanic garden as "botanic gardens." In the case of the Royal Botanic Gardens at Kew, near London, the plantations comprise two distinct gardens which were united to form the grounds of the present institution, hence the plural form is both official and actual.

The use of "botanic" or "botanical" is a matter of arbitrary choice on the part of the institution, but the *official* name should be carefully followed by the public.

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[1] This title was the happy suggestion of Mrs. Franklin Jones for a talk to be given by the writer before the Garden Club of New Rochelle, in October, 1928.

[2] *Docentry.* To assist members and others in studying the collections the services of a docent (teaching guide) may be obtained. This service is *free of charge to members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements may be made in advance by application to the Curator of Public Instruction. No parties of less than six adults will be conducted. Application may be made by mail or by telephone (*Pro*spect 6173).

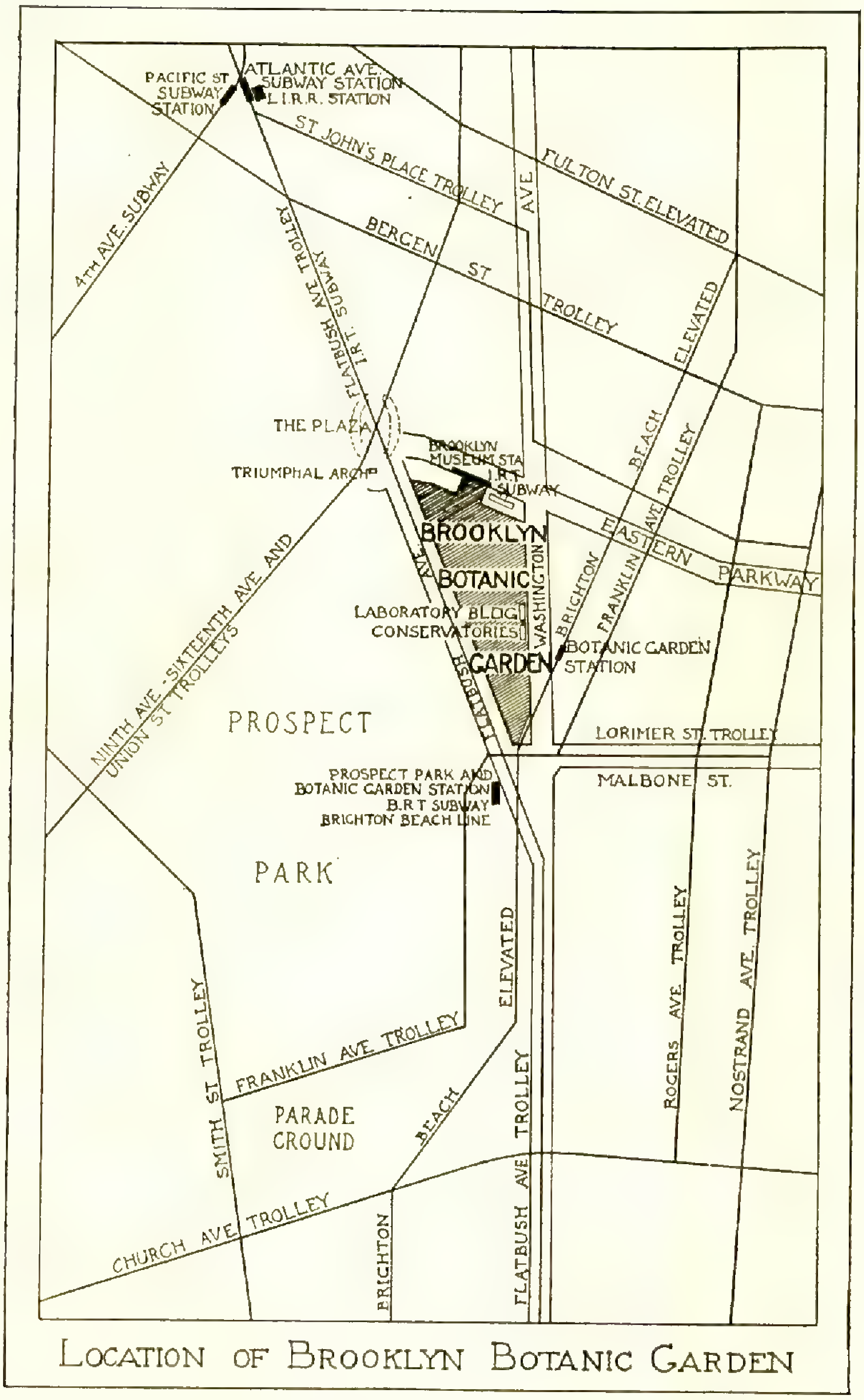

FIG. 2. Location of Brooklyn Botanic Garden with reference to streets and transit lines.

## Botanic Garden versus Park

The term "botanic garden" has been used for centuries and is still used to designate a garden area planted in accordance with botanical considerations. Such botanic gardens are not uncommon as adjuncts of the botanical departments of colleges and universities, or as special features in a public park.

A modern botanic garden, however, considered as a separate organization, is more than a garden or gardens. It is a scientific and educational institution which usually comprises two or more of the following features: Plantations, Conservatories, Herbarium, Library, Laboratories, Class Rooms and Lecture Rooms, and an indoor Botanical Museum. We specially say "indoor" museum, because the plantations of a botanic garden are to be considered as an outdoor museum, the exhibits in which are living plants, arranged on some botanical basis, and labelled. It is this which fundamentally differentiates a botanic garden from a park, in which plants are arranged for landscape effect, with little or no regard for their botanical relationship. Another distinction between a botanic garden and a park is that a park is intended primarily for recreation, whereas, if the grounds of a botanic garden are large enough to possess park features, they are nevertheless not intended primarily for recreation but for education, and all regulations and restrictions governing their use by the public are based on that fact.

## Automobiles

As a rule, automobiles are not admitted to the grounds of the Brooklyn Botanic Garden. Their exclusion adds materially to the charm of the Garden, and contributes to the safety and comfort of visitors.

Special permits admitting automobiles are issued *to members only* for the purpose of enabling aged or infirm persons or convalescents to enjoy the grounds. In each case a botanic garden guide must accompany the automobile to insure freedom from police interference, and also to act as a guide to the driver. The guide will also serve as docent. For such services there is no charge. Arrangements must be made in advance, preferably a day or two before the contemplated visit.

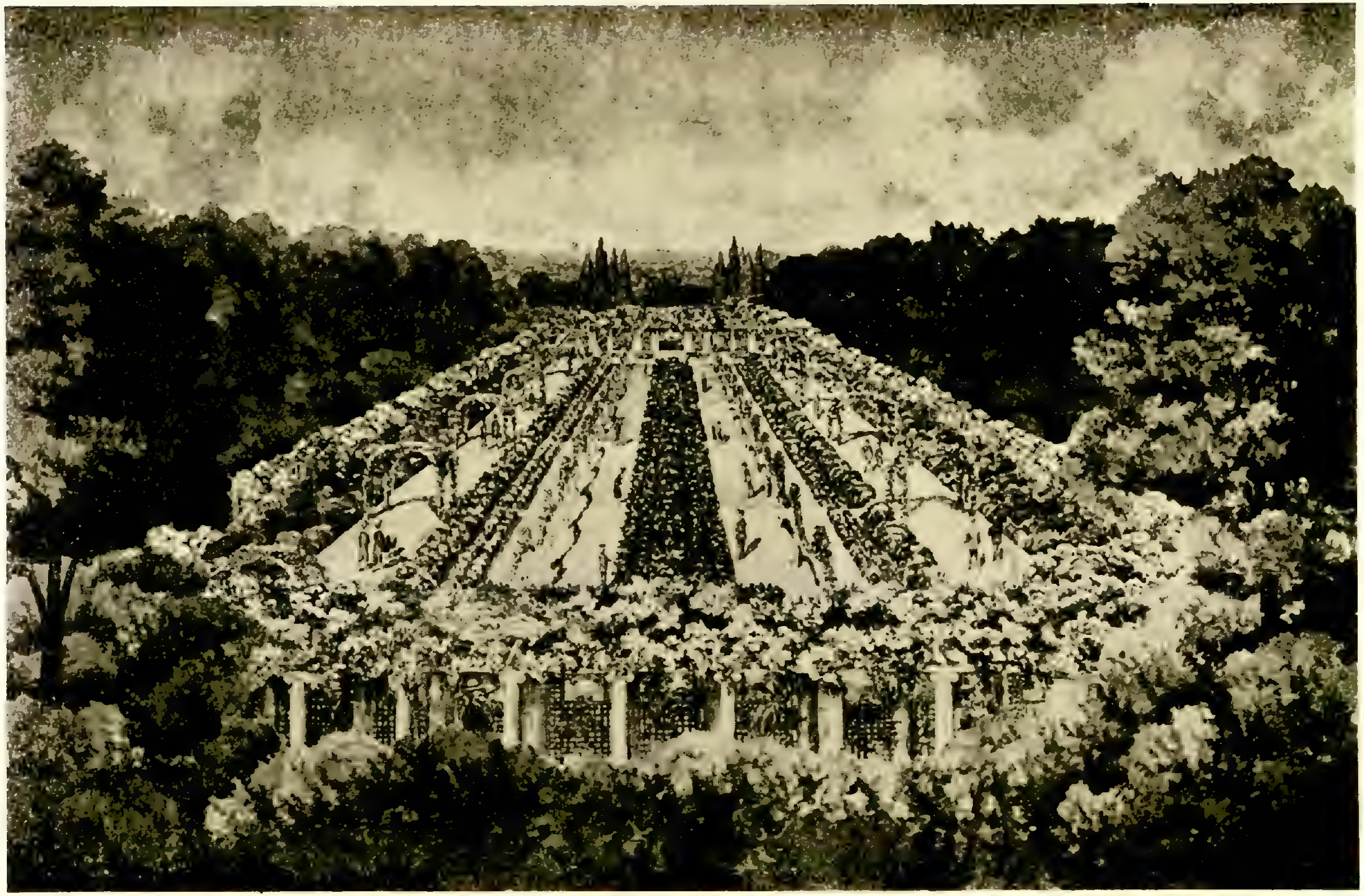

FIG. 3. Rose Garden. Photograph of the colored sketch prepared by the landscape architect, Mr. Harold A. Caparn. The garden was installed in 1927 and planting is still in progress in 1929 (5710).

## Leaving and Returning to Automobiles

Visitors coming by motor car for a walk about the grounds may arrange to return to the car at the same gate by which they enter; or, arrangements may be made to meet the driver at any other gate agreed upon, thus avoiding a long walk across the Garden after the object of the visit has been accomplished. The various possibilities as to entrance and exit will become evident on consulting the folded map.

Visitors coming to view some special exhibit or section of the grounds should consult the folded map to ascertain the nearest entrance. See also the following designation of gates for the various sections.

## Entrances and Exits

There are seven public entrances and exits to the Brooklyn Botanic Garden as follows:

*On the North*

1. Eastern Parkway
   Between Brooklyn Museum and Mt. Prospect Reservoir

*On the East*

2. Washington Ave., North Gate
   South of Eastern Parkway and north of the Laboratory Building.
3. Laboratory Building
   1000 Washington Ave., south of entrance No. 2.
4. Washington Ave., South Gate
   North of Empire Boulevard.

*On the West*

5. Flatbush Ave., South Gate
   Near Empire Boulevard.
6. Flatbush Ave., Middle Gate
   North of entrance No. 5.
7. Flatbush Ave., North Gate
   South of Grand Army Plaza, the new Brooklyn Public Library Building and Mt. Prospect Reservoir.

The most direct way to reach any given entrance is indicated on the diagram on page 154 showing the location of the Botanic Garden with reference to streets and transit lines. Consult also the directions for reaching the Garden, as given on the third cover page.

## Plantations

The Brooklyn Botanic Garden grounds comprise the following sections or gardens. The numbers in parentheses, following the name of the section or garden, indicate the number of the nearest or most convenient entrance or entrances, as given on page 157.

1. General Systematic Section (3–6)
2. Native Wild Flower Garden (1, 7)
3. Children's Garden (4, 5)
4. Japanese Garden (2)
5. Rock Garden (5, 6)
6. Ecological Garden (5, 6)
7. Water Gardens (2, 3)
8. Iris Gardens (3, 6)
9. Rose Garden (1, 6)
10. Various horticultural collections, as for example:
    - Lilacs (1, 6)
    - Peonies (3)
    - Cannas (5, 6)
    - Hardy Asters (5, 6)
    - Dahlias (5, 6)
    - Chrysanthemums (5, 6)
    - Azaleas, and Rhodendrons (2, 5)
    - Flowering cherries, plums, apples, etc. (1, 2, 6)
11. Miscellaneous plantations
    - *a*. Naturalistic plantings of bulbs (1–6)
    - *b*. Decorative and screen plantings, such as the trees and shrubs on the border mound, along the street fence, etc.
    - *c*. Nursery (Not open to the public)
    - *d*. Experimental Garden (Not open to the public)
12. Horticultural Garden (1, 7)

The above features are here listed approximately in the order in which they have been developed in the Brooklyn Botanic Garden.[1]

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[1] An Economic Garden to illustrate economic or "useful" plants, and a Morphological Garden to illustrate facts of the external form or *morphology* of plants are a part of the complete plan of the Botanic Garden, and have once been installed but, for certain reasons, have been temporarily discontinued.

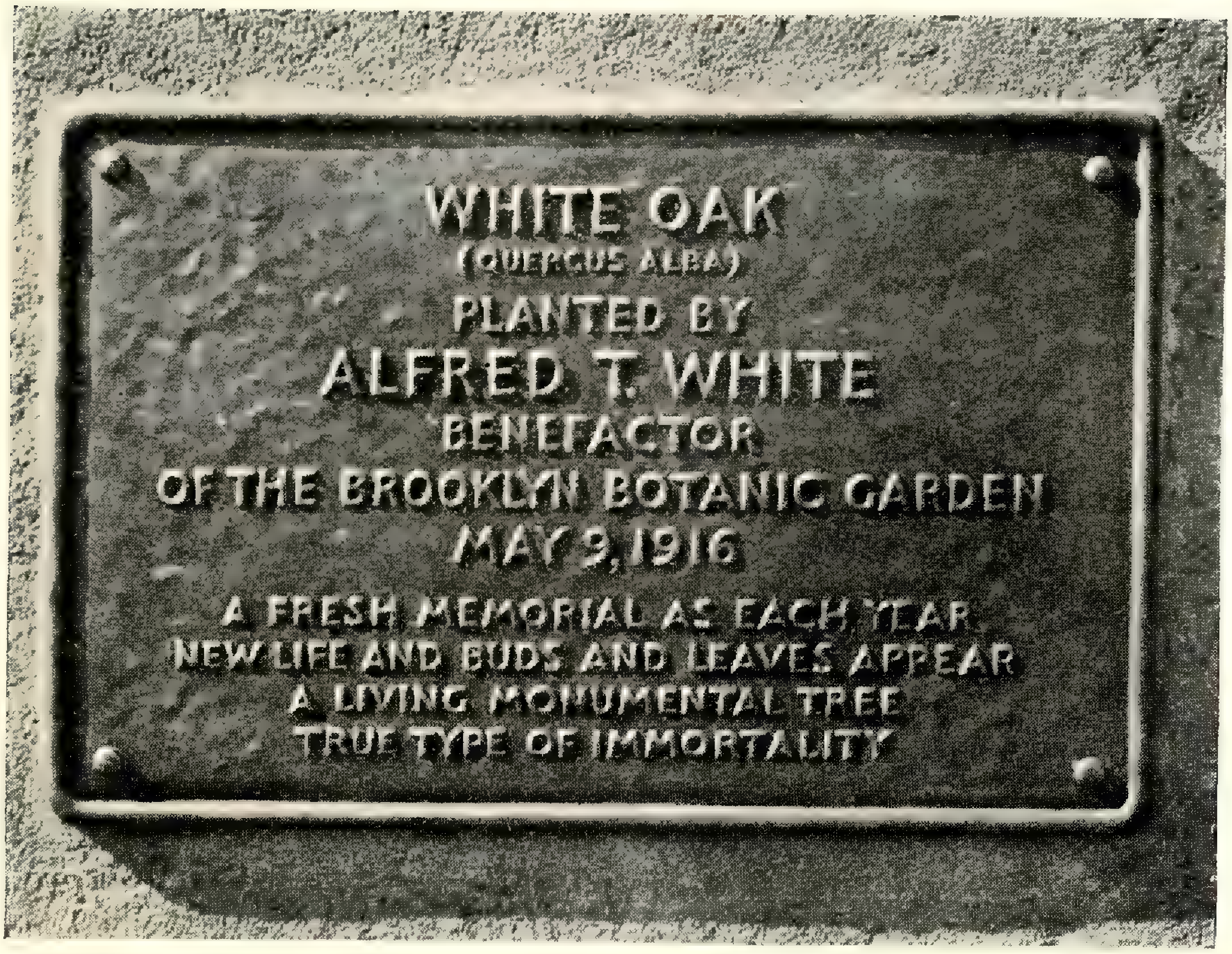

Fig. 4. Bronze tablet at White Oak Circle (3988).

## Horticultural and Landscape Plantings

*The Border Mound.*—With the exception of the Eastern Parkway frontage and the site of the buildings on Washington Ave., the Botanic Garden property is surrounded by a " Border Mound " of earth, planted with trees and shrubs. This feature was devised by Olmstead and Vaux, the landscape architects of Central Park, New York, and of Prospect Park, Brooklyn, for the purpose of shutting out from the parks the confusion and noise of adjacent streets, thereby giving greater privacy and quiet within the parks. The plan was an inspiration of genius, and is a larger factor than most people realize in giving the Botanic Garden the seclusion and rural character which visitors feel within the grounds.

The Border Mound is planted without reference to the botanical relationships of the plants, but the screen planting, in places, affords a protection which is taken advantage of for certain doubt-fully hardy species, which are thus found outside the Garden area where they belong botanically.

*Bulbs in the Lawn.*—In the fall of 1921, 25,000 bulbs of Crocus were planted naturalistically on the slope of the Border Mound in the southwest portion of the Garden. This was one of the first (if not the first) naturalistic plantings of bulbs in a public park in America. This planting was increased in 1923–25 until there are now 54,000 bulbs. Other areas have been planted with various varieties of yellow Daffodils (about 27,000), Poet's Narcissus (15,000), yellow and scarlet Tulips (20,000), Snowdrops (*Galanthus*), Winter-aconite (*Eranthis hyemalis*), Grape-hyacinth (*Muscari botryoides*), Dwarf Blue Hyacinth (*Hyacinthus azureus,* often mistaken for a Grape-hyacinth), and others.

*Miscellaneous.*—Other horticultural collections are the varieties of Lilac, Iris, Canna, Mallow, Hollyhock, Hardy Aster (varieties of the New England and New York *Aster*), Chrysanthemum, Dahlia, Azalea, Rhododendron, and other horticultural groups.

## A Walk through the Garden

### *Point of Beginning*

An itinerary through the Botanic Garden plantations may, of course, begin at any one of the seven entrances.

### *Time Required*

It is physically possible to walk around the periphery of the Garden, from any given gate and back, in about one half hour, but such a walk would not allow for giving more than passing attention to the plantations.

*Not less than one hour* should be allowed for a leisurely walk, and for obtaining a conspectus of plants in bloom or other features.

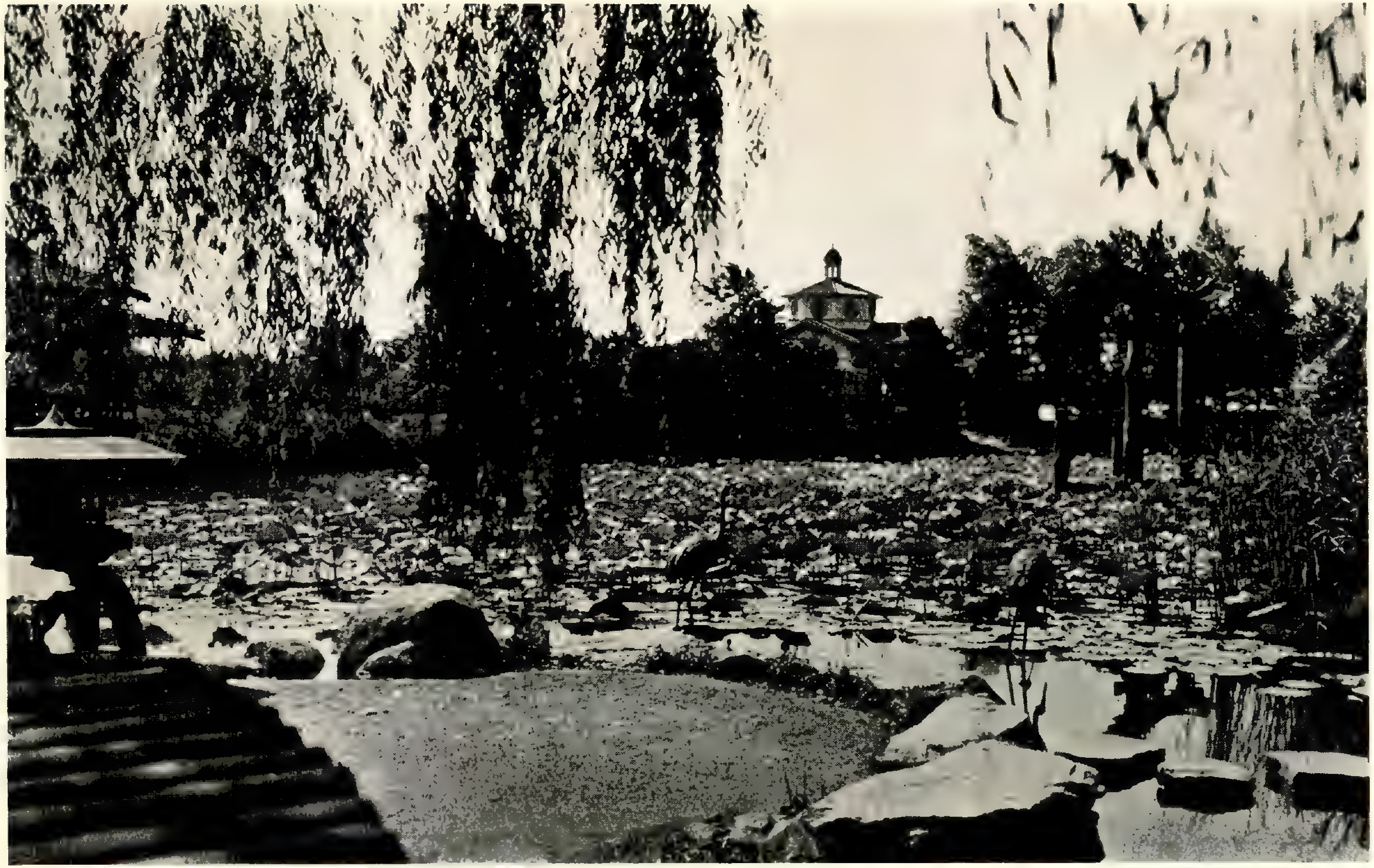

FIG. 5. Scene in the Japanese Garden. Stone lantern and drum bridge at the left. Storks and East Indian Lotus (*Nelumbo*) in the Lake. Torii at the right. Laboratory Building in the middle distance (5620).

## SUGGESTED ITINERARY

### Horticultural Section

Entering at the Eastern Parkway Gate (number 1),[1] the visitor finds himself at once in the Horticultural Section, comprising chiefly horticultural varieties of trees, shrubs, and herbaceous plants derived by plant breeding from wild species.

This section occupies what is known to the Garden authorities as the "North Addition," since it was not in the original tract set aside by the City for botanic garden purposes. It is still (1929) in its early developmental stage, its development having been delayed (now for several years) for lack of funds.

### *What are Horticultural Varieties?*

It may be noted here that the *particular kinds* of wild plants are called *species*. Under cultivation new forms often arise not found growing wild; they may arise from wild species or from other cultivated forms. These are called "garden forms" or "horticultural varieties," and may arise in at least three ways: 1. Seed variation; 2. Bud variation; 3. Crossing or hybridizing.

1. *Seed variation:* One of the best known horticultural varieties resulting from seed variation is the famous original Concord Grape, which was produced by a seed of the wild grape (*Vitis Labrusca*) planted at Concord, Mass., in the fall of 1843 by Ephraim W. Bull. This plant fruited for the first time in 1849, and all other Concord Grape vines in the world have been derived, either directly or indirectly, from this one by propagation from cuttings. The famous "Golden Glow" was derived by seed variation, as was also the Burbank potato.

2. *Bud variation:* Occasionally one or more of the buds on a plant will produce branches differing characteristically from the typical branches. This is called *bud sporting*. It is believed to have been the origin of the Washington or California *Navel Orange*. One of the most famous bud sports among flowering plants is the *Moss Rose*. Some horticultural varieties of potato arose by bud sporting, the process being called by farmers, "mixing in the hill." Among houseplants the Boston Fern (and other varieties of *Nephrolepis exaltata*) arose by bud sporting.

3. *Crossing or hybridizing:* Plants are crossed by transferring pollen from the flowers of one to the stigmas of the flowers of another. In this manner have arisen numerous varieties of apples, pears, and other fruits, and innumerable varieties of such plants as Iris, Orchid, Peony, Tulip, many Roses (*e.g.*, Hybrid Teas, Hybrid Perpetuals), the Lilac, and others.

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[1] By consulting the folded map, it will be found easy to begin the walk at any entrance and follow the suggested itinerary from that point.

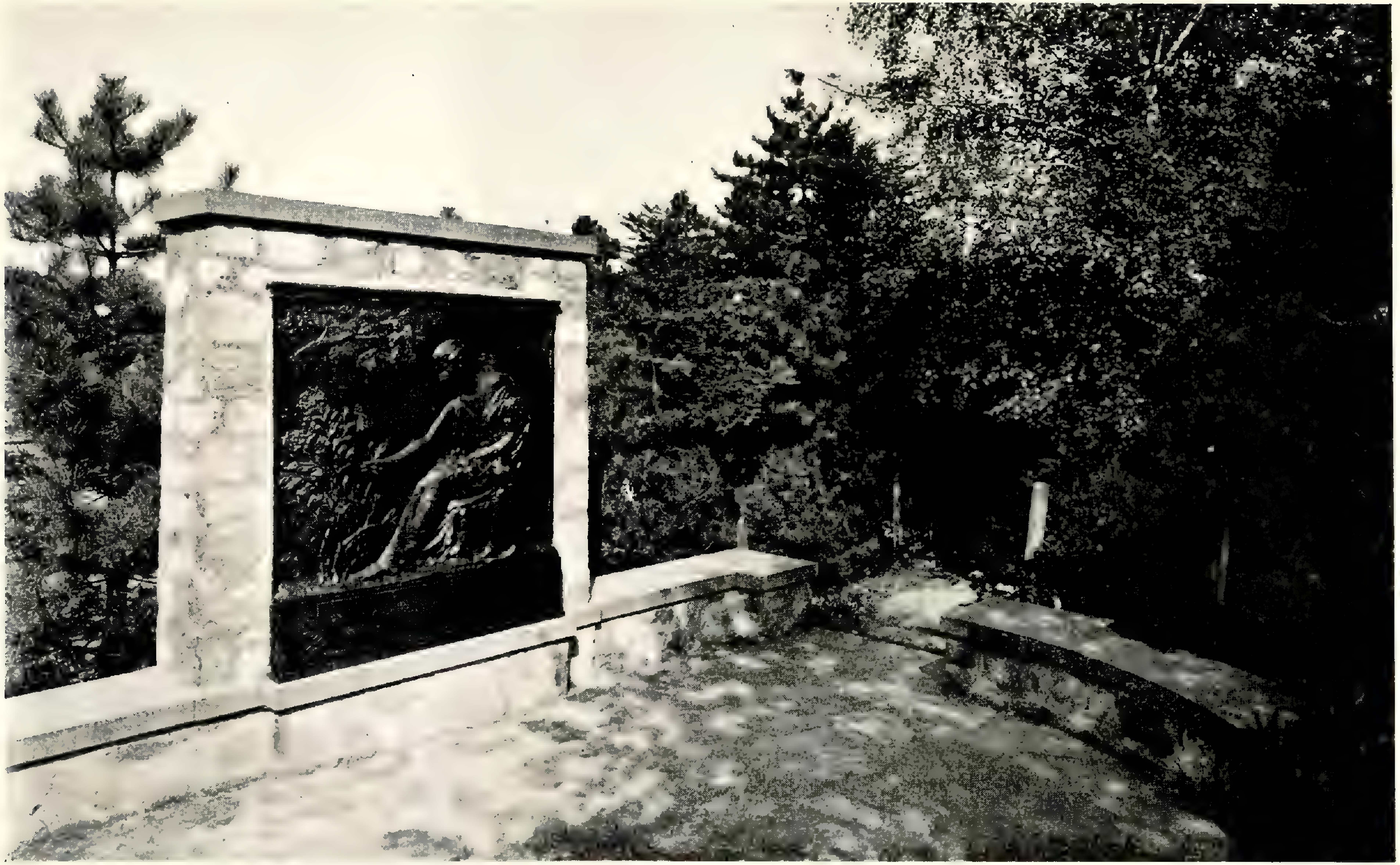

Fig. 6. Alfred T. White Memorial. Unveiled June 7, 1923 (5633).

## **Native Wild Flower Garden** (Local Flora Section)

Walking south past Mt. Prospect Reservoir (on the right) one comes to the entrance to the Native Wild Flower Garden.

This section contains only plants that grow wild within a radius of 100 miles of Brooklyn. This indicates roughly the "Local Flora Range" which is defined by the Torrey Botanical Club as including all of the State of Connecticut; Long Island; in New York State, the counties bordering the Hudson River on both sides up to and including Columbia and Greene, also Sullivan and Delaware Counties; all of New Jersey; and, in Pennsylvania, the counties of Pike, Wayne, Monroe, Lackawanna, Luzerne, Northampton, Lehigh, Carbon, Bucks, Berks, Schuylkill, Montgomery, Philadelphia, Delaware, and Chester.

Native trees have been planted in the northern end of this section so as to secure the ecological conditions of a small forest or "woods." This facilitates the growing of many species which are usually found growing wild only in such environment.

Near the southern end of the area is a small **bog.** A bog differs from a swamp in that the water of the former contains a much larger percentage of humic acid than does the latter, and certain plants, such as Cranberries, Sphagnum Moss, Pitcher Plants, and others, prefer an acid substratum. This difference in acidity results from the fact that a **swamp** has both inlet and outlet (water flowing *through* it), while a **bog** has an inlet (water flowing *into* it), but no outlet, except through evaporation into the air. It is this that results in a concentration of humic acid, just as evaporation (and no streams flowing out) makes the Dead Sea and the ocean salt. The humic acid results from the decay of plant tissue, caused by the action of bacteria.

Woodland plants may be found on either side of the Wild Flower Path along the crest of the West Border Mound, as well as in the "valley" or main portion of this Section.

After walking south through the Wild Flower Garden one comes out near the

## Lilac Triangle

The Lilac collection was at first confined to this triangular area, but has since been extended northward as part of the Horticultural

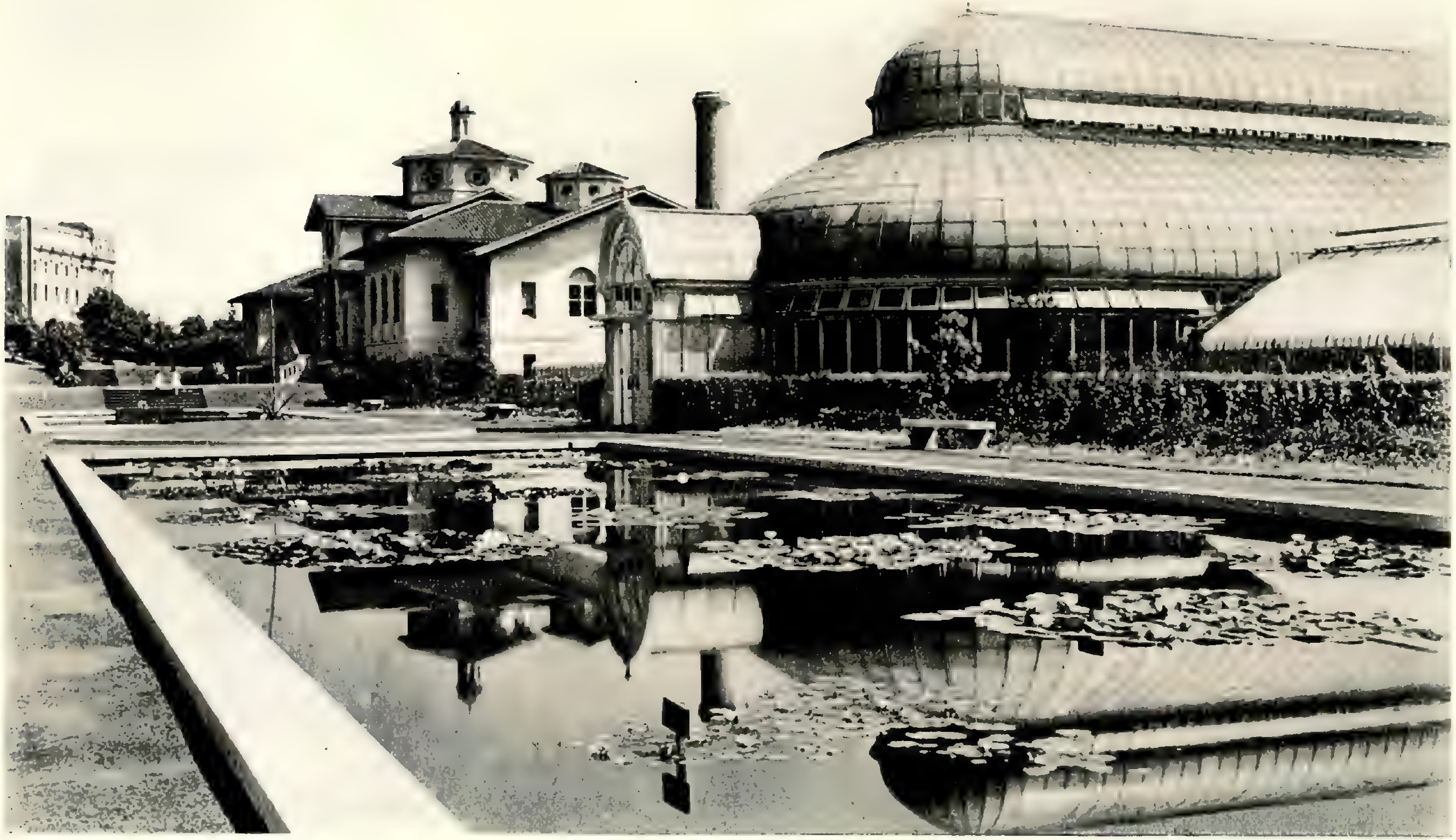

Fig. 7. Conservatory Garden. Hardy waterlilies in the near pool; tropical forms in the distant pool (4186).

Section. There are some 200 or more horticultural varieties of the Lilac in this collection. The wild species of Lilac (the genus *Syringa*) may be found with their botanical relatives in the Olive Family, in the southern part of the General Systematic Section.

West of the Lilac Triangle is the site of the Economic Garden. See the foot note on page 159.

## Rose Garden

After viewing the Lilacs it will be best to pass northward toward the Museum embankment and enter the Rose Garden at one of the north gates.

This garden, enclosed by pavilion, pergolas, and trellis fence, was designed both as to structures and planting plan, by Mr. Harold A. Caparn, consulting landscape architect of the Botanic Garden. It is 500 feet in greatest length, and 93 feet in width. It was made possible by a gift from Mr. and Mrs. Walter V. Cranford, of Greenwich, Conn., and was constructed and the first planting done in 1927 under the supervision of Mr. Montague Free, horticulturist of the Botanic Garden. It was first opened to Members of the Botanic Garden on Thursday, June 21, 1928, and to the general public on the following afternoon.

The garden contains about 3,000 plants (bush roses, climbers, post-roses, standards, festoons, etc.). The three most important classes of horticultural roses are in the beds, the Hybrid Teas in the two side-beds and the Hybrid Perpetuals with Dwarf Polyantha roses (introduced as "Baby Ramblers," though they do not ramble) as a border in the central beds. The bush roses in the beds are arranged so that one passes from the older varieties in the northern beds past successively newer forms to the latest introductions in the southern beds, thus illustrating the historical development of the horticultural varieties of roses.

The trellis fence is intended not merely for an enclosure and protection to the garden, but for the display of climbing roses, as a background for the bush roses of all kinds, and especially for the *species* or wild roses, together with the classes of garden roses (Rugosas, Lambertianas, etc.) most nearly related to them.

Near the right (West), as one leaves the south gate of the Rose Garden, is **Exit No. 6** (Middle Flatbush Ave. gate).

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ground on which the White Memorial stands is Boulder Hill, so named from the large glacial boulder on its summit. (*See Brooklyn Botanic Garden Guide No. 3, The Story of Our Boulders,* to be published soon.)

From the site of this Memorial one may view the **East Indian Lotus** and various kinds of **Water Lilies** growing in the Lake. This forms one of the **Water Gardens.**

### Conservatory Garden

A short side trip toward and past the Laboratory Building will take one down the steps and through the site of the Formal Garden to be developed in front of the Building, thence down a second flight of steps to the **Conservatory Garden,** containing two Water Lily Pools. The northern one has heated water and contains only tropical forms, including the *Victoria regiæ Trickeri.* The southern pool contains the hardy sorts that do not require heated water. These two pools were the gift of Mr. Alfred T. White.

From the Conservatory Garden one may retrace his steps to the main entrance of the Laboratory Building and thence proceed west (to the left) ; or, if one did not take the side trip to the lily pools, he may pass from the White Memorial down the west slope of Boulder Hill; or, if one did not pass around the lake, he may continue past the Torii and along the west shore of the lake to its outlet, coming, in either case, to the beginning of the

### Systematic Section

*What the Systematic Section Aims to Show*

1. Different kinds of plants.
2. The relationship (botanical affinities) of plants.
3. The sequence of plant *Orders.*

   The sequence here followed is approximately that of the Engler System, modified to some extent by horticultural and other requirements. Other sequences have been proposed, and new investigations will, no doubt, result in the formation of other probable sequences.

4. How the plants of a given group may be used in decorative planting (*e.g.,* for hedges, massing, herbaceous borders, ground cover, etc.).

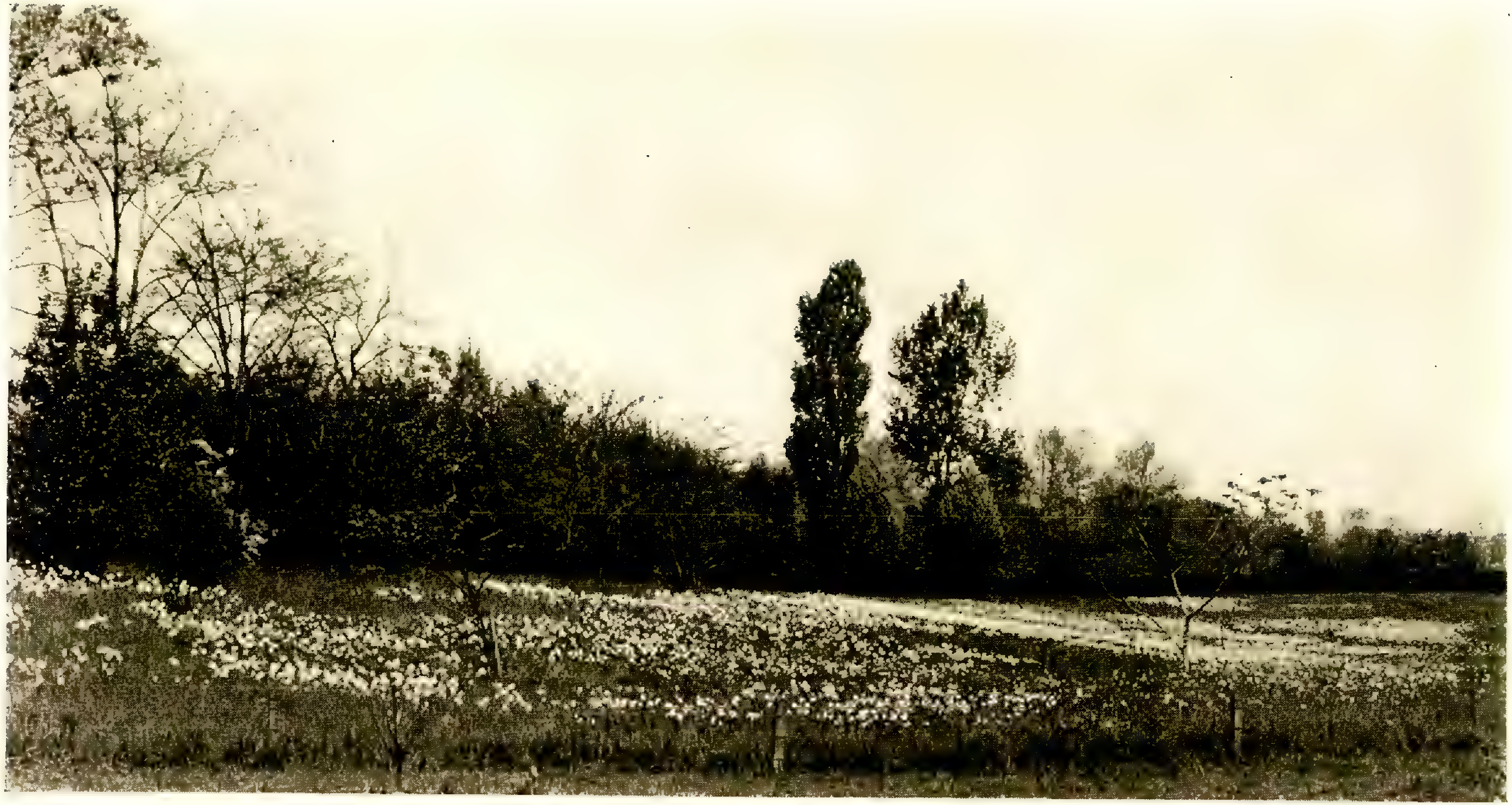

Fig. 10. Poet's Narcissus (*N. poeticus*) on the Border Mound. 15,000 bulbs (5799).

5. Horticultural varieties derived from wild species by plant breeding.

Most of the plants in the General Systematic Section do not occur in the Local Flora area, as defined on page 164, but a few Local Flora plants are included in groups not otherwise represented.

### *Classification of Plants*

The Plant Kingdom may be divided into the following groups, the figures in parentheses indicating the approximate number of families in each group:

1. *Cryptogams* (Plants without seeds)
    - *a.* Thallophytes
        - Algae (124)
        - Fungi (183)
    - *b.* Bryophytes
        - Liverworts (5)
        - Mosses (55)
    - *c.* Club-Mosses (4)
    - *d.* Horsetails (1)
    - *e.* Ferns (17)
2. *Phanerogams* (Plants with seeds)
    - *a.* Gymnosperms (Naked seeds)
        - Cycadales (Tropical and Sub-Tropical only) (1)
        - Ginkgoales (Maidenhair Tree) (1)
        - Coniferales (Conifers) (7)
        - Gnetales (Joint Firs) (3)
    - *b.* Angiosperms or Flowering Plants (Seeds enclosed in an ovary)
        - *a.* Dicotyledons (with two seed-leaves) (254)
        - *b.* Monocotyledons (with one seed-leaf) (45)

All the larger groups above listed are again subdivided into successive groups, as follows:

**Order** (a group of related Families)
  **Family** (a group of related Genera)
    **Genus** (a group of related Species)
      **Species** (a group of closely related Individuals)
        (A species may be further subdivided into *Varieties* or *Forms*)
          **Individual** (the unit of the Plant Kingdom)

The Latin names of the Orders end in *-ales, e.g.,* Cycadales (Cycad Order), *Papaverales* (Poppy Order); of the Families (with few exceptions) in *-aceae, e.g., Cycadaceae* (Cycad Family), Papaveraceae (Poppy Family.

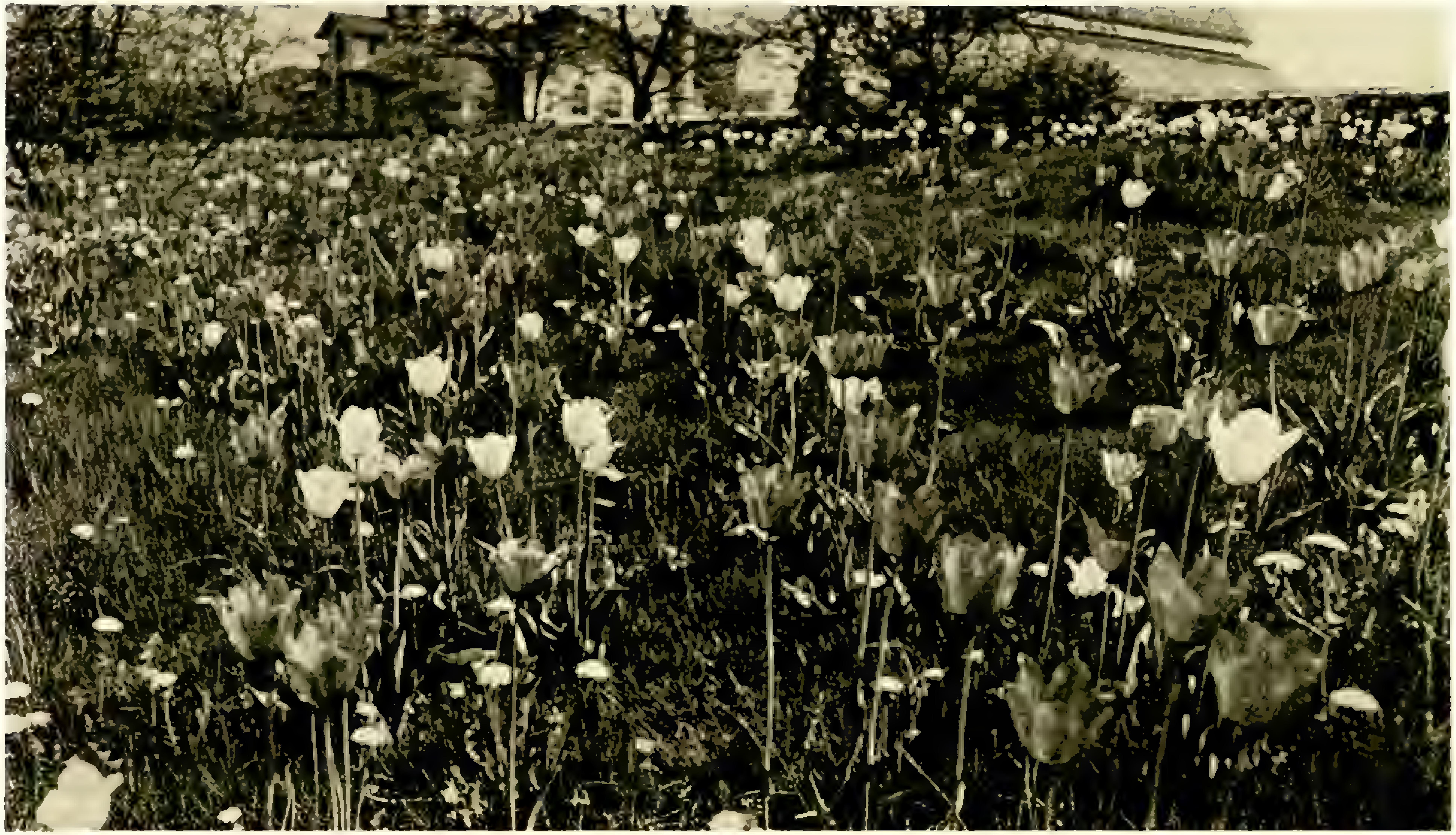

Fig. 11. Tulips on the hillside west of the Conservatories. Those appearing white in the picture are the clear yellow *Tulipa Gesneriana lutea;* the others are the scarlet *T. Gesneriana spathulata,* 20,000 in all, belonging to the "Cottage" tulip group (5801).

## Planting Plan

The plants that have no flowers are found north of the walk which leads from Magnolia Triangle to the Ginkgo Triangle, and are east of the Brook in the area which includes Boulder Hill.

With the exception of the Cryptogams, the plants in the General Systematic Section are arranged with a wide grass aisle (approximately 30 feet) between the Orders, and a narrow aisle (about 10 feet wide) between the families. As one looks over this Section from any elevated point the planting plan stands out very distinctly.

The sequence of Orders in the General Systematic Section is shown on the folded map at the end of this Guide.

### *Boundaries of Orders and Families*

The boundaries of the various Orders and Families that contain shrubs are, in many cases, planted with hedges formed of plants that belong to the given Order or Family, or with plants of the given group that have special ornamental value.

### *Herbaceous and Woody Plants Together*

Most botanic gardens comprise at least three sections, as follows:

1. Arboretum (Latin, *arbor,* a tree) comprising only trees.
2. Fruticetum (Latin, *frutex,* a shrub) comprising only shrubs and vines. Vines are not recognized separately from shrubs in the manuals of botany, a vine being technically considered as a climbing or trailing shrub.
3. Herbaceous Garden, comprising only herbaceous (*i.e.,* non-woody) plants.

These three divisions classify plants according to their form and size, and the possession of woody *versus* herbaceous stems, not according to their botanical relationship.

In the Brooklyn Botanic Garden, educational (and, to a subordinate degree, landscape and spatial) considerations led to grouping the woody and herbaceous plants together in the General Systematic and Local Flora Sections. This plan was suggested by

Mr. Harold A. Caparn, consulting landscape architect of the Garden, and is worthy of special note because it not only secures pleasing landscape effects, not otherwise possible in the limited space at our disposal, but also because it gives added educational features by showing the botanical affinities of trees and shrubs with herbaceous plants, and the relative percentages of woody and herbaceous plants (within the limits of hardiness at Brooklyn) in the various families, orders, and larger subdivisions of the Plant Kingdom. Thus, for example, it will be seen that in the group of the Poppies and their relatives (*Papaverales*) there are no trees or shrubs hardy in Brooklyn; in the group of the Roses and their relatives (*Rosales*) there is a generous proportion of both woody and herbaceous plants; while in the Horsechestnut and Willow groups (*Sapindales* and *Salicales*) there are few if any herbaceous plants hardy here.

## CRYPTOGAMS

At the beginning of the Systematic Section, nearest the Lake, are the Cryptogams, as yet (1929) represented chiefly by the Ferns.

## GYMNOSPERMS

As noted above, Gymnosperms are so called because their seeds are not enclosed in a seed-case or *ovary* (as occurs, for example, with beans or apples).

The *Cycadales* are represented by living specimens in House No. 11 of the Conservatories.

The *Ginkgoales* comprise only one Family, *Ginkgoaceae,* represented by only one living species, *Ginkgo biloba,* the geologically oldest existing arborescent type. It bears naked, plum-like seeds often mistaken for fruit.

Until recently it was believed that *Ginkgo* was strictly a cultivated plant (a "living fossil"), preserved by the fact that it was cultivated in the temple gardens of China and Japan, but botanical explorers have recently reported finding it growing wild in western China. In a preceding geological age (the Tertiary) it was widely distributed in Siberia, Europe, the British Isles, North America, and Greenland, but is now known only from a comparatively small area in western China. It is extensively planted, and is a very satisfactory tree for parks and streets.

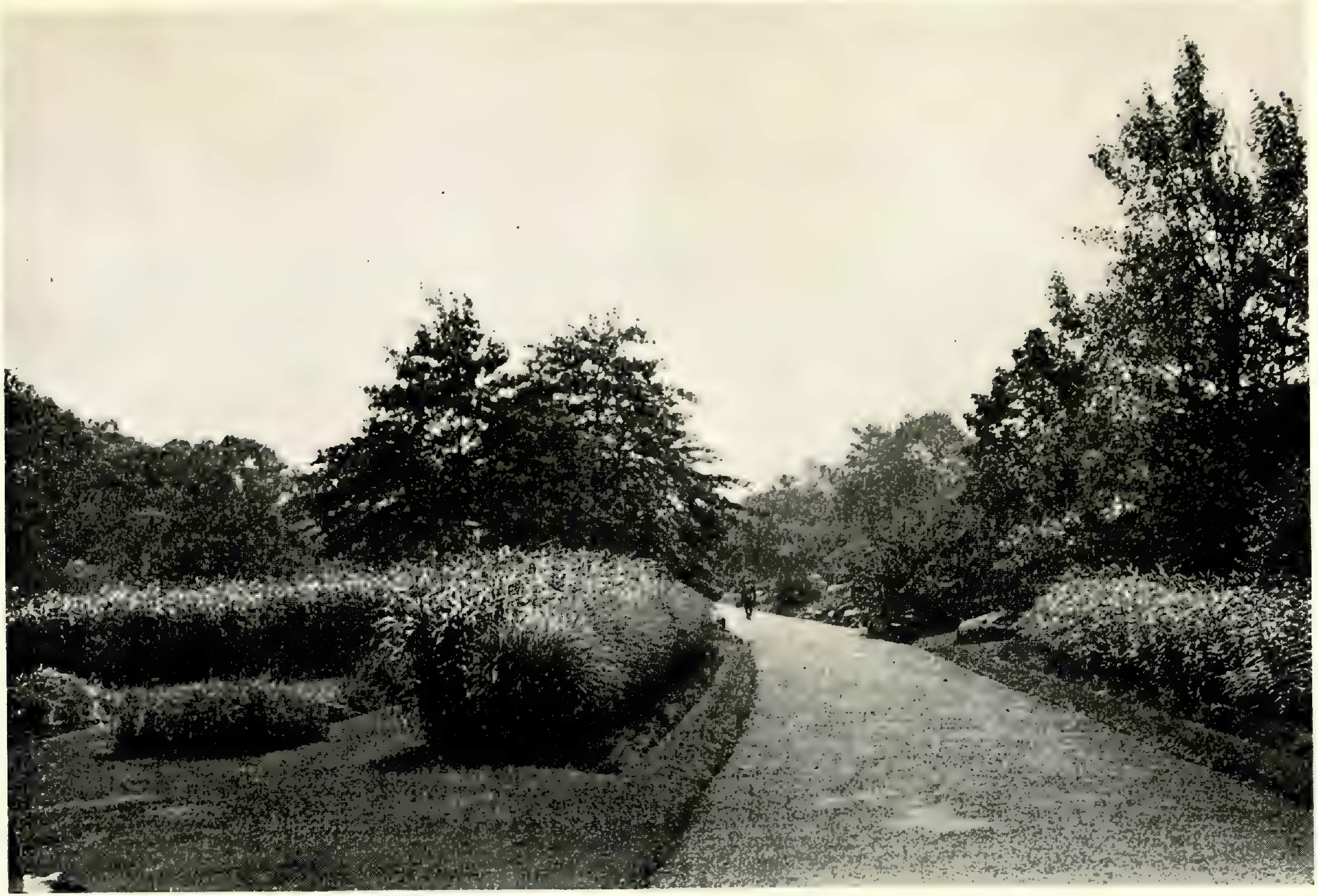

FIG. 12. Border planting of ornamental Grasses, September 17. On the left the species (from right to left) are: Blue Fescue (*Festuca ovina glauca*). Narrow Leaved Eulalia (*Miscanthus sinensis gracillimus*), and Awnless Eulalia (*M. saccharifer*). On the right the tall grasses are the Banded Eulalia (*M. sinensis zebrina*). A portion of the systematic exhibit of Gramineae is shown at the extreme left (5618).

The *Coniferales* comprise, in our range, the Yew (*Taxaceae*), the Pine (*Pinaceae*), the Bald Cypress (*Taxodiaceae*), and the Cypress (*Cupressaceae*) Families. The hard, bony seed of the Yew is surrounded by a fleshy disk which resembles a red berry.

The genera of the Pine Family all bear their seeds in cones. In the Juniper (*Juniperus*) the fleshy cone-scales are so fused together that the result appears like a berry. The Botanic Garden collection includes Pines, Larches, Hemlocks, Spruces, California Bigtree (*Sequoia gigantea*), Bald Cypress (*Taxodium distichum*), Cryptomeria, Cedars (Cedar of Lebanon, *Cedrus Libani;* the Atlas Cedar, *C. atlantica*), and others.

## ANGIOSPERMS

### *Dicotyledons without Petals* (*Apetalous*)

Southwestward from the Gymnosperms are Angiospermous trees having flowers without floral envelopes (calyx and corolla), and usually borne in cone-like *catkins* or *aments* (the so-called ament-bearers or *Amentiferae*). In the Hickory, Oak, Chestnut, and others only the staminate flowers are in catkins. Most of these forms are wind-pollinated, including the Birches, Alders, and others, of the Birch Family (*Betulaceae*). Here, also, are the Beeches and Oaks of the Beech Family (*Fagaceae*); the Walnuts and Hickories, of the Walnut Family (*Juglandaceae*); and the Elms (Elm Family, *Ulmaceae*).

South of the east-west walk, leading to the White Oak Circle, are the Mulberries and Paper-Mulberry, wind-pollinated trees of the Mulberry Family (*Moraceae*), and the insect-pollinated Fig of the same Family.

The insect-pollinated Willows and Poplars (Willow Family, *Salicaceae*), are planted along the Brook (toward the south) in order to secure the streamside conditions of a natural habitat.

### *Dicotyledons with Separate Petals* (*Polypetalous*)

The plants in all the Orders on the east side of the Brook, beginning with the Magnolias (*Magnoliaceae*) and proceeding down through the Garden to the Dogwoods (*Cornaceae*), have flowers with separate petals, usually in 5's, less commonly in 4's.

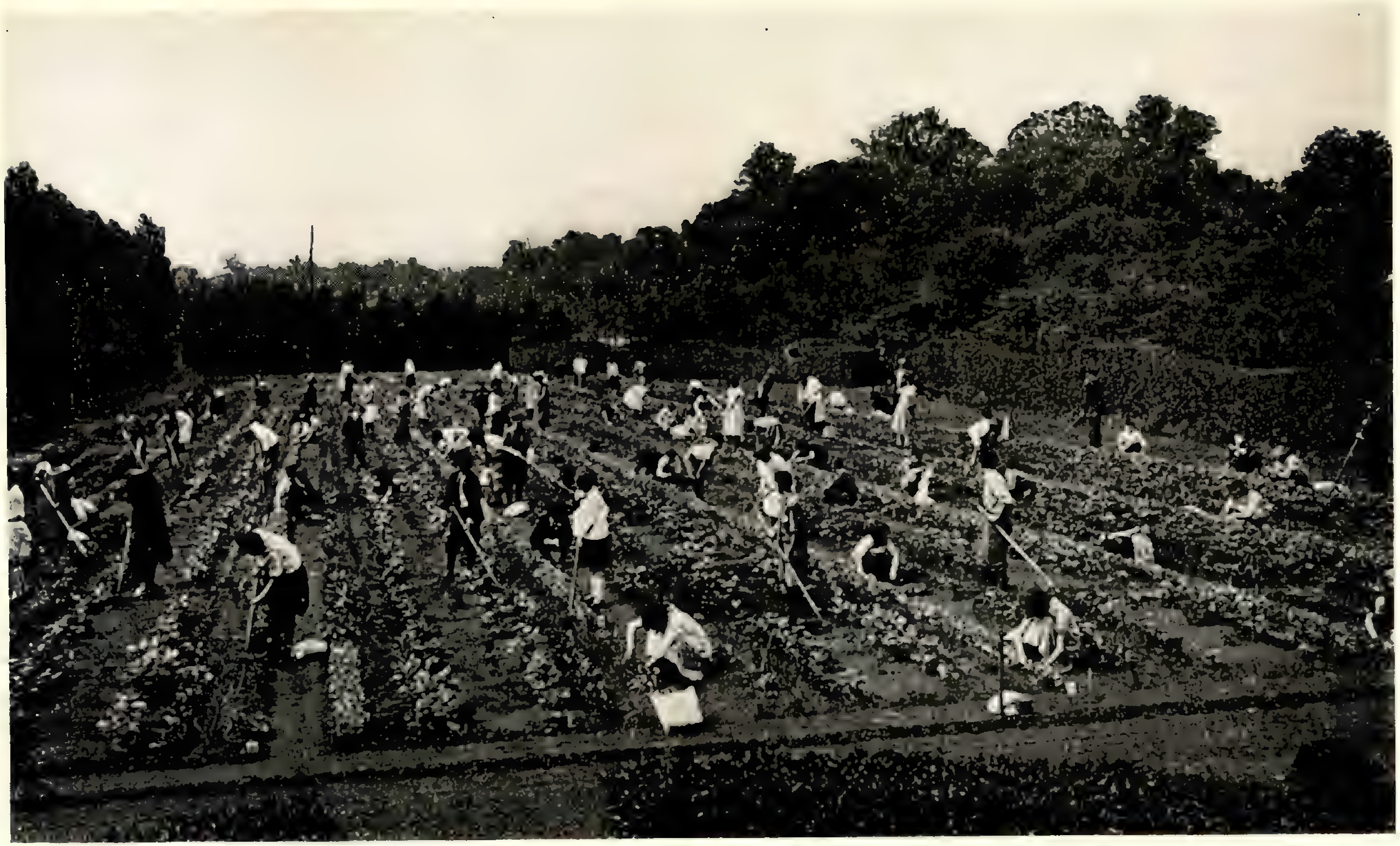

Fig. 13. Scene in Children's Garden, June 1 (5107).

### Experimental Garden

At the left (east), as one passes down through the Garden from the Polygonales toward the Heaths (Ericales), is the **Experimental Garden,** located south of the Conservatories and devoted to work in Plant Pathology, Plant Breeding (Genetics), and other experimental work. This garden is not open to the public. It is enclosed by a fence covered with Japanese Honeysuckle, and between the paved walk and this fence is a border planting of about 100 horticultural varieties of *Narcissus.*

### Linden Triangle

Between the Experimental and Children's Gardens is the **Linden Triangle,** containing a specimen of the Silver Linden (*Tilia argentea*), planted on October 25, 1923, by Ellen Eddy Shaw, curator of elementary instruction.

### Children's Garden and Building

South of the Linden Triangle is the **Children's Garden,** with the **Children's Building** near the north end. This Garden comprises individual garden plots sufficient for the accommodation of over 150 boys and girls. At the south end is the **Shakespeare Garden,** a gift, in 1925, from Mr. Henry C. Folger, a well known Brooklyn collector of Shakespeareana. Surrounding the Children's Building is a horticultural planting of herbaceous plants, trees, and shrubs, laid out as an adjunct to the educational work with children. Over the entrance to the Children's Building is a quotation from the poet, Wordsworth:

*He is happiest who hath power*
*To gather wisdom from a flower.*

### Elm Triangle

West of the service gate of the Children's Garden and south of Azalea Knoll is the **Elm Triangle** containing a specimen of the American Elm (*Ulmus americana*), presented and planted on Arbor Day, April 24, 1925, by the Girl Scouts of Flatbush.

### Systematic Section (Continued)

After the Dogwoods (noted on page 178), the plants of the remaining Orders of Dicotyledons—Heath Order (*Ericales*) to Bell-

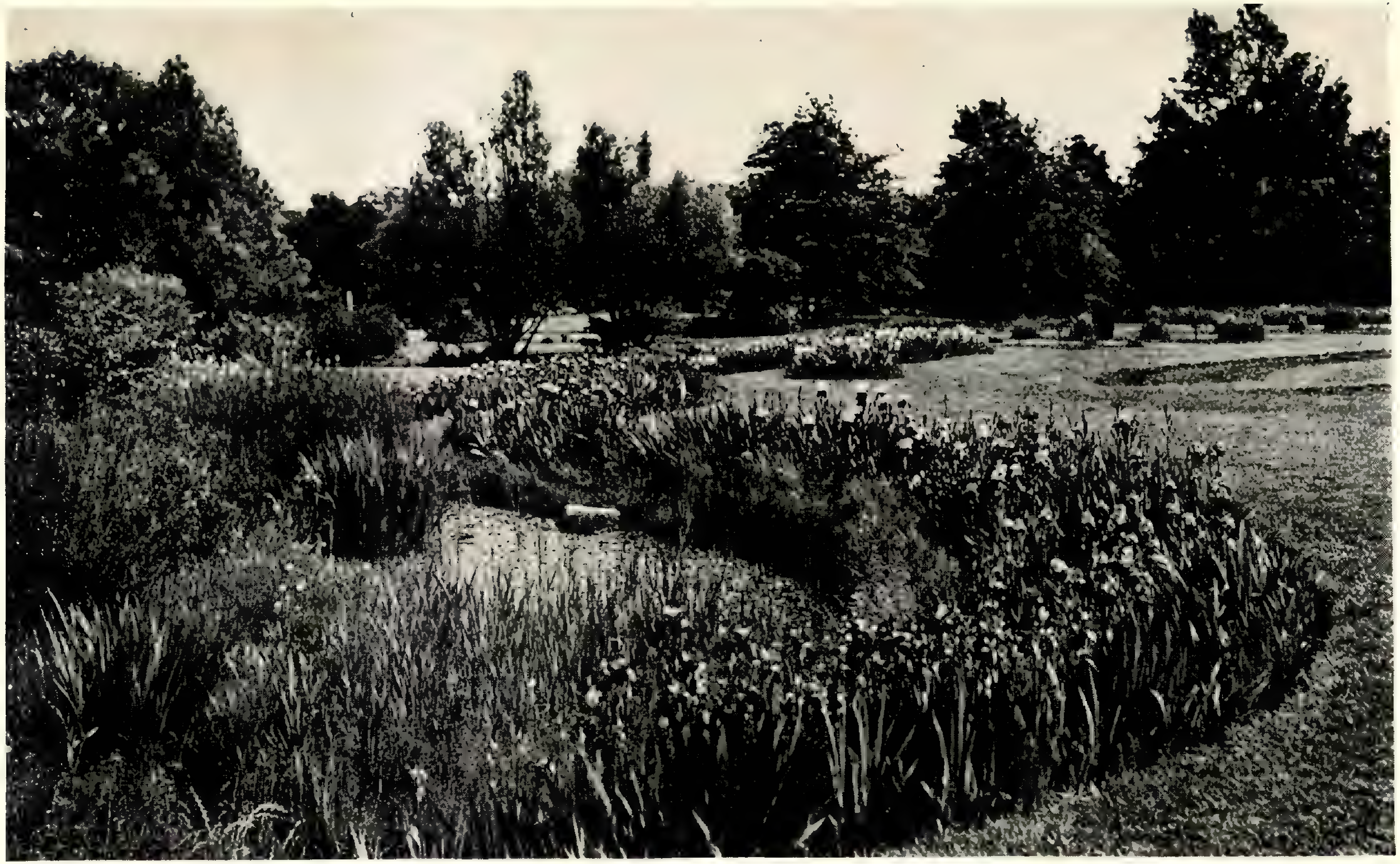

Fig. 14. Bearded Iris. West side of Brook, facing south. June 5 (4954).

flower Order (*Campanulales*)—have flowers whose petals are more or less united.

The Heath Order, including Azaleas, Rhododendrons, Laurel, Heather (*Calluna*), Heath (*Erica*), and others, is on **Azalea Knoll** and **Azalea Bank.**

After the Heaths, the Orders of the Dicotyledons follow up the west side of the Brook, terminating with the plants whose flowers have petals united to form a bell-shaped floral envelope—the **Campanulales,** named from the Bellflower (*Campanula*). The chief family of this order is the **Compositae,** the most highly developed of all the dicotyledonous plant families, comprising such forms as the Daisy, Burdock, Dandelion, and their relatives and, among cultivated plants, the numerous horticultural varieties of Chrysanthemum, Hardy Aster, Dahlias, and others.

The Dicotyledons terminate opposite the Rock Garden, and are separated from the Monocotyledons (on the north) by the Ecological Garden.

### *Monocotyledons*

All of the plants having embryos with one seed-leaf (Monocotyledons), and with petals (when present) in 3's, are north of the Ecological Garden and west of the Brook. They comprise the Lily, Iris, Canna, Grass, Orchid, and other Families. The Orchids are on the Border Mound, west of the paved walk. They are the most highly specialized of the Monocotyledons.

The Monocotyledons appear to have descended from the Dicotyledons, the process involving various structural and anatomical changes, including the hereditary failure of one of the seed-leaves or cotyledons to develop, thus resulting in embryos with only one seed-leaf.

Note that there are no monocotyledonous trees hardy in this climate, and only a few shrubs, such, for example, as Smilax.

### *Ecological Controls*

In order to take advantage of the most favorable cultural conditions, and also for planting effect, the Irises (like the Willows and Poplars mentioned on page 178) are extended along the Brook, on either side.

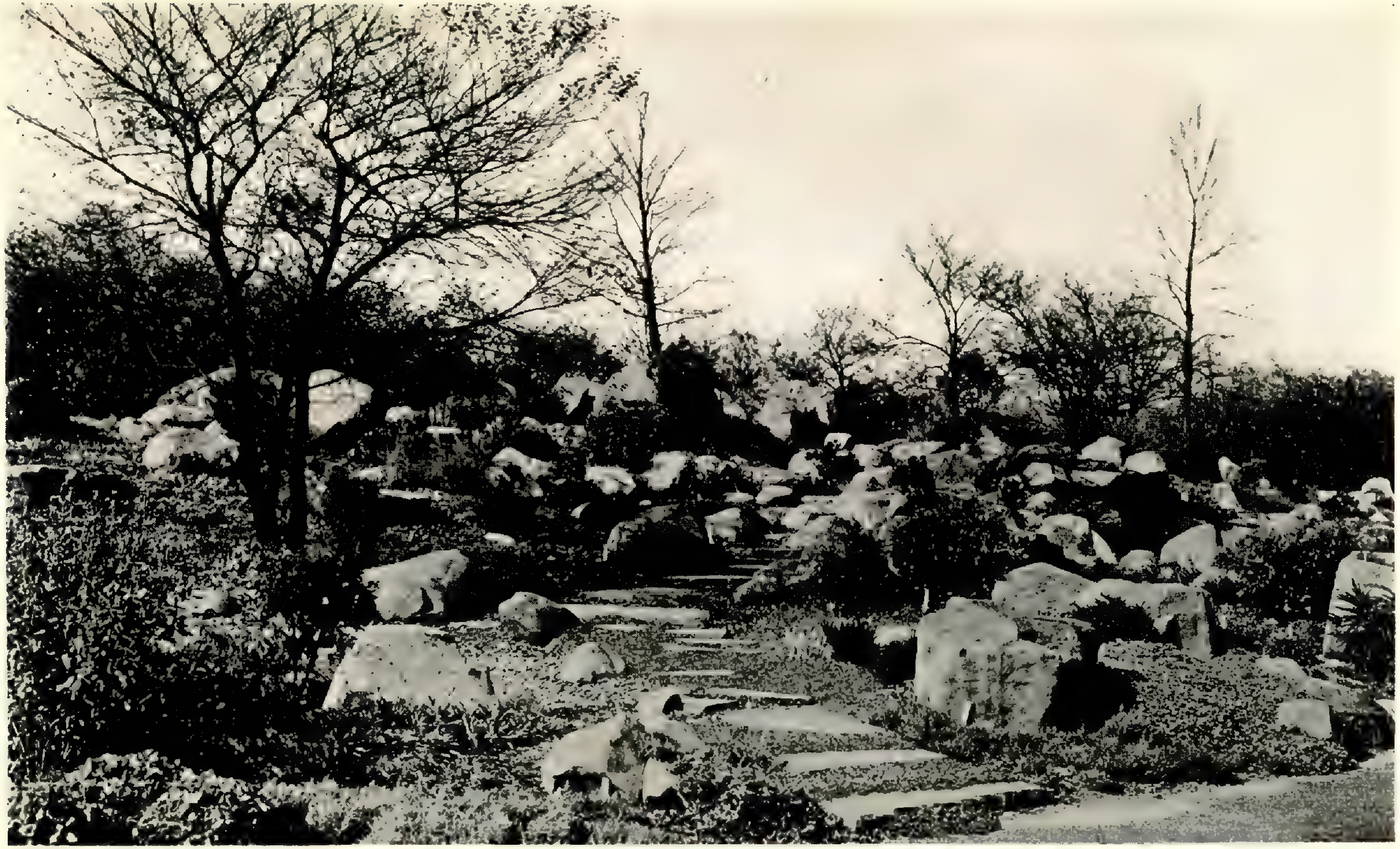

FIG. 15. Rock Garden. View facing northwest (2585).

## Rock Garden

The beauty and interest of the Rock Garden has doubtless arrested the attention of the visitor before he proceeded to the Monocotyledons. The Rocks are glacial boulders which were deposited, at what is now the north end of the Botanic Garden, by one of the continental ice sheets that terminated at Long Island during the Ice Age and formed the *terminal moraine,* known locally as " the backbone of Long Island." The boulders were uncovered during the grading of the area between the Museum Building and Mt. Prospect Reservoir, and constitute the only logical (as well as the only available) material for a Rock Garden here, since there is (with an unimportant exception, near the north-west shore) no ledge rock on the Island. (See *Brooklyn Botanic Garden Guide No. 3, The Story of our Boulders,* to be issued later.)

The Rock Garden, constructed under the supervision of Mr. Montague Free, in 1916, contains about 800 different species of Alpine and rock-loving (saxatile) plants, from the Cordilleras of Western America, the Andes, Alps, Ural Mts., Himalayas, and other regions.

So far as known, this was the first rock garden to be developed in a public park in America. Even a brief description must be reserved for a special guide book.

## Ecological Garden

The word *ecology* is derived from two Greek words meaning " house " and " science." Ecology, therefore means " house science," or the science of the home life of plants (or of animals, as the case may be). This phase of botanical science has to do with the relation of plants to their surroundings or environment; more specifically to the various *factors* of environment, such as soil, water, light, gravity, air, wind, other plants, insects, and other animals, etc.

A special guide is required for a full explanation of the Ecological Section. The vistor will note from the labels that the various beds are devoted to illustrating the relation of plants to the factors above mentioned. A wide range of environment is provided by the swamp, by the running water of the brook that flows into it, by the quiet pools and waterfalls in the brook below the swamp, by open and shady places, and by the rock garden with its moist and its dry, well-drained areas. The Rock Garden is, in reality, a portion of the Ecological Section.

### The Merchild

The **Bronze Statue**, Merchild, on the boulder just below the outlet of the Swamp, is the work of Miss Isabel M. Kimball, of Brooklyn, and was presented to the Botanic Garden in 1928 by Mr. R. R. Bowker, a member of the Board of Trustees.

### *The Monocotyledons*

If the visitor has not already done so, he may now pass north to that part of the General Systematic Section that contains the Monocotyledons, described on page 182.

### The Return Journey

From the Monocotyledons one may now proceed back through the Botanic Garden, past the Rose Garden to the Eastern Parkway Gate **(Exit No. 1).** If he has come by motor car, and has made arrangements in advance (see page 157) he may leave the Garden at the Flatbush Ave., Middle Gate **(Exit No. 6),** and find his automobile waiting for him there.

### Conservatories

If one has time for more than the tour of the grounds, he may find the Conservatories of interest. They are located on the western (Washington Ave.) side of the Garden, and are open free to the public daily from 10 a.m. to 4 p.m.; on Sundays from 1 p.m. to 4 p.m. In summer they are open until 4:30 p.m. The hours of closing are fixed so as to give the gardeners time to wet down the plants before they leave for the day.

### Library

The reference library, containing at present (1929) about 10,000 volumes and 10,000 bound pamphlets, and having on file the current numbers of over 900 periodicals on plant life, gardening, and closely related subjects, is in the Laboratory Building, and is open free to the public daily, except Sunday, from 9 a.m. to 5 p.m. (Saturdays, 9 a.m. to 12 m.).

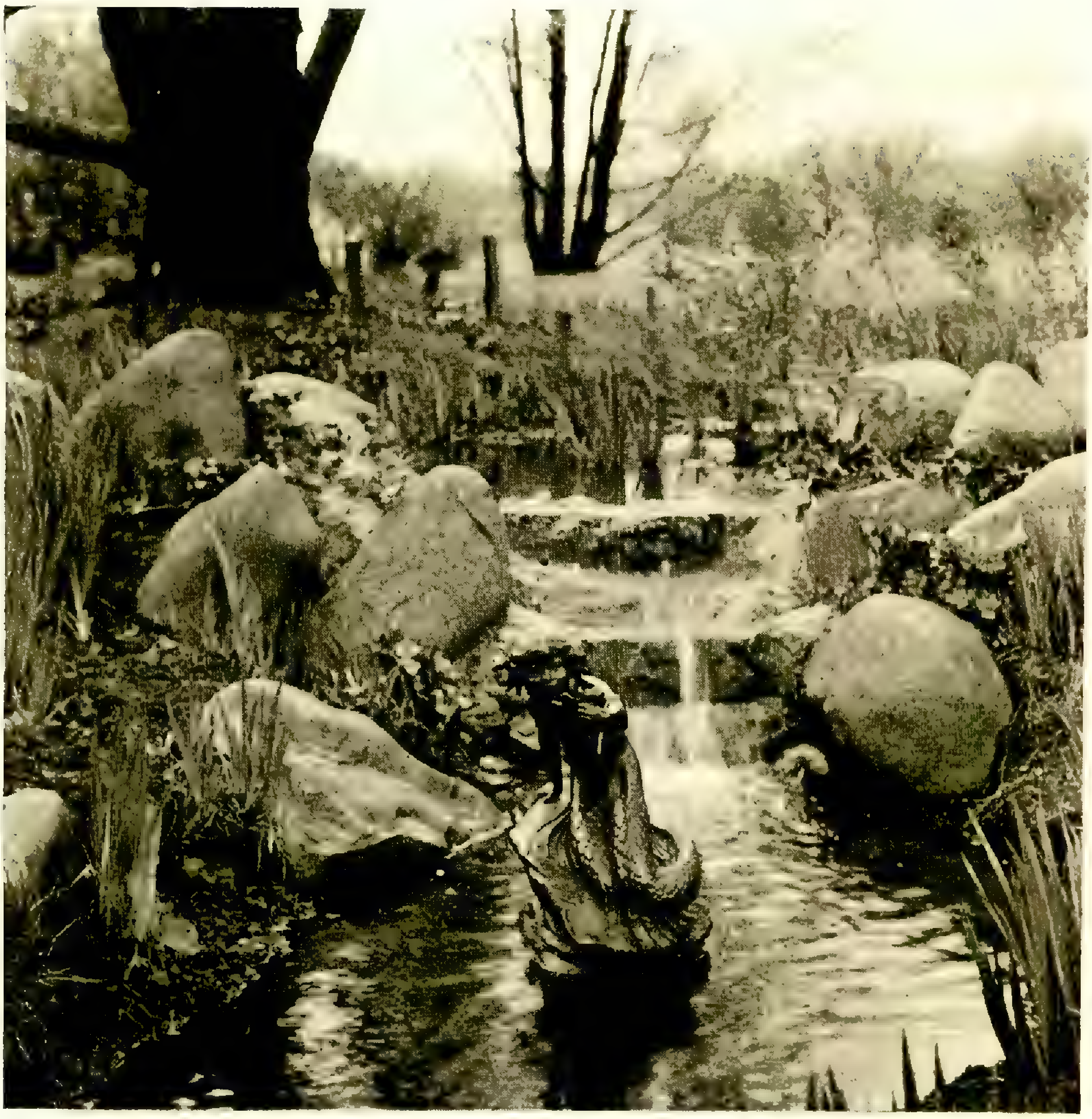

FIG. 16. The Merchild. Statuette by Isabel M. Kimball. Presented by Richard R. Bowker (6491).

### Bureau of Information

Inquiries concerning **Membership** in the Botanic Garden, or concerning any aspect of plant life and gardening or the classes, lectures, and other activities of the Botanic Garden may be made at the **Information Desk** on the first floor of the Laboratory Building, or by writing or telephoning (*Telephone: Prospect 6173*).

### Souvenir Postcards and Publications

Postcard views of the Botanic Garden, and of interesting plants, popular *Leaflets*, and such *Guide Books* as have been published may be purchased for nominal sums at the Information Desk.

Copies of the *Annual Report* are available in limited quantity for distribution to adults only.

## Suggestions Welcomed

The management of the Brooklyn Botanic Garden will be glad to receive any suggestions or constructive criticisms as to how the collections may be made more attractive or educationally more effective. Suggestions should be addressed to the director.

## THE BOTANIC GARDEN AND THE CITY

The Brooklyn Botanic Garden, established in 1910, is a Department of the Brooklyn Institute of Arts and Sciences. It is supported in part by municipal appropriations, and in part by private funds, including income from endowment, membership dues, and special contributions. Its articulation with the City is through the Department of Parks.

The City owns the land devoted to Garden purposes, builds, lights, and heats the buildings, and keeps them in repair, and includes in its annual tax budget an appropriation for other items of maintenance. One third of the cost of the present buildings (about $300,000) was met from private funds.

All plants have been purchased with private funds since the Garden was established. In addition to this, it has been the practice of the Garden to purchase all books for the library, all specimens for the herbarium, all lantern slides, and numerous other items, and to pay certain salaries, with private funds.

*The urgent needs of the Garden for private funds for all purposes are more than twice as great as the present income from endowment, membership dues, and special contributions.* The director of the Garden will be glad to give full information as to possible uses of such funds to any who may be interested.*

---

* A written *Agreement,* dated August 17, 1914, between the City of New York and the Institute, touching the Botanic Garden, published in full in the *Brooklyn Botanic Garden Record,* for April, 1915, amends the agreement of September 9, 1912, which amends the original agreement of September 28, 1909, published in the *Record* for January, 1912.

## INFORMATION CONCERNING MEMBERSHIP

The Brooklyn Institute of Arts and Sciences is organized in three main departments: 1. The Department of Education. 2. The Museums. 3. The Botanic Garden.

Any of the following seven classes of membership may be taken out through the Botanic Garden:

| | |
|---|---|
| 1. Annual member | $ 10 |
| 2. Sustaining member | 25 |
| 3. Life member | 500 |
| 4. Permanent member | 2,500 |
| 5. Donor | 10,000 |
| 6. Patron | 25,000 |
| 7. Benefactor | 100,000 |

Sustaining members are annual members with full privileges in Departments one to three. Membership in classes two to seven carries full privileges in Departments one to three.

In addition to opportunities afforded to members of the Botanic Garden for public service through coöperating in its development, and helping to further its aims to advance and diffuse a knowledge and love of plants, to help preserve our native wild flowers, and to afford additional and much needed educational advantages in Brooklyn and Greater New York, members may also enjoy the privileges indicated on the following page.

Further information concerning membership may be had by addressing The Director, Brooklyn Botanic Garden, Brooklyn, N. Y., or by personal conference by appointment. Telephone, 6173 Prospect.

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## GENERAL INFORMATION

MEMBERSHIP.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, Brooklyn, N. Y.* Telephone, 6173 Prospect.

THE BOTANIC GARDEN is open free to the public daily from 8 a.m. until dark; on Sundays and Holidays open at 10 a.m.

ENTRANCES.—On Flatbush Avenue, near Empire Boulevard (Malbone Street), and near Mt. Prospect Reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Montgomery Street.

TO ASSIST MEMBERS and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one week in advance. No parties of less than six adults will be conducted.

TO REACH THE GARDEN take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, and Tompkins Avenue trolleys to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street and Vanderbilt Avenue trolleys to Prospect Park Plaza and Union Street.

# PUBLICATIONS

## OF THE

# BROOKLYN BOTANIC GARDEN

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly beginning with 1929. Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, announcements of courses of instruction, seed list, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others $1.50 a year, 25 cents a number. Circulates in 41 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Circulates in 47 countries.

Volume I. *Dedication Papers:* comprising 33 scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. 521 pages. Price $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. Price $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor, June 10, 1927. 151 pages. Price $1.60.

CONTRIBUTIONS. Established, April 1, 1911. Papers originally published in periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume. Circulates in 34 countries.

*52. Inheritance studies in Pisum. VI. Multiple allelomorphism and the inheritance of green and yellow foliage and pod color.* 16 pages. 1927.

*53. Mutation, adaptation to temperature differences, and geographical distribution in plants.* 12 pages. 1928.

*54. The vegetation of the Allegany State Park.* 121 pages. 1928.

*55. Physiologic races of bunt of wheat.* 14 pages. 1928.

*56. The inheritance of resistance of oat hybrids to loose and covered smut.* 48 pages. 1928.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

SEED LIST. (*Delectus Seminum*) Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 143 botanic gardens and institutions located in 42 countries.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in coöperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription, $7.00 a year. Circulates in 48 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $4.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly. Subscription, $6.00 a year. Circulates in 37 countries.

HERBARIUM OF
THOMAS J. DELENDICK

# BROOKLYN BOTANIC GARDEN RECORD

VOL. XVIII JULY, 1929 NO. 4

# PUBLIC EDUCATION
AT THE
# BROOKLYN BOTANIC GARDEN

"For the advancement of botanical science and knowledge . . .
for affording instruction in the same . . . and for the entertainment, recreation, and instruction of the people . . ."

PUBLISHED BIMONTHLY
AT LANCASTER, PA
BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
BROOKLYN, N. Y.

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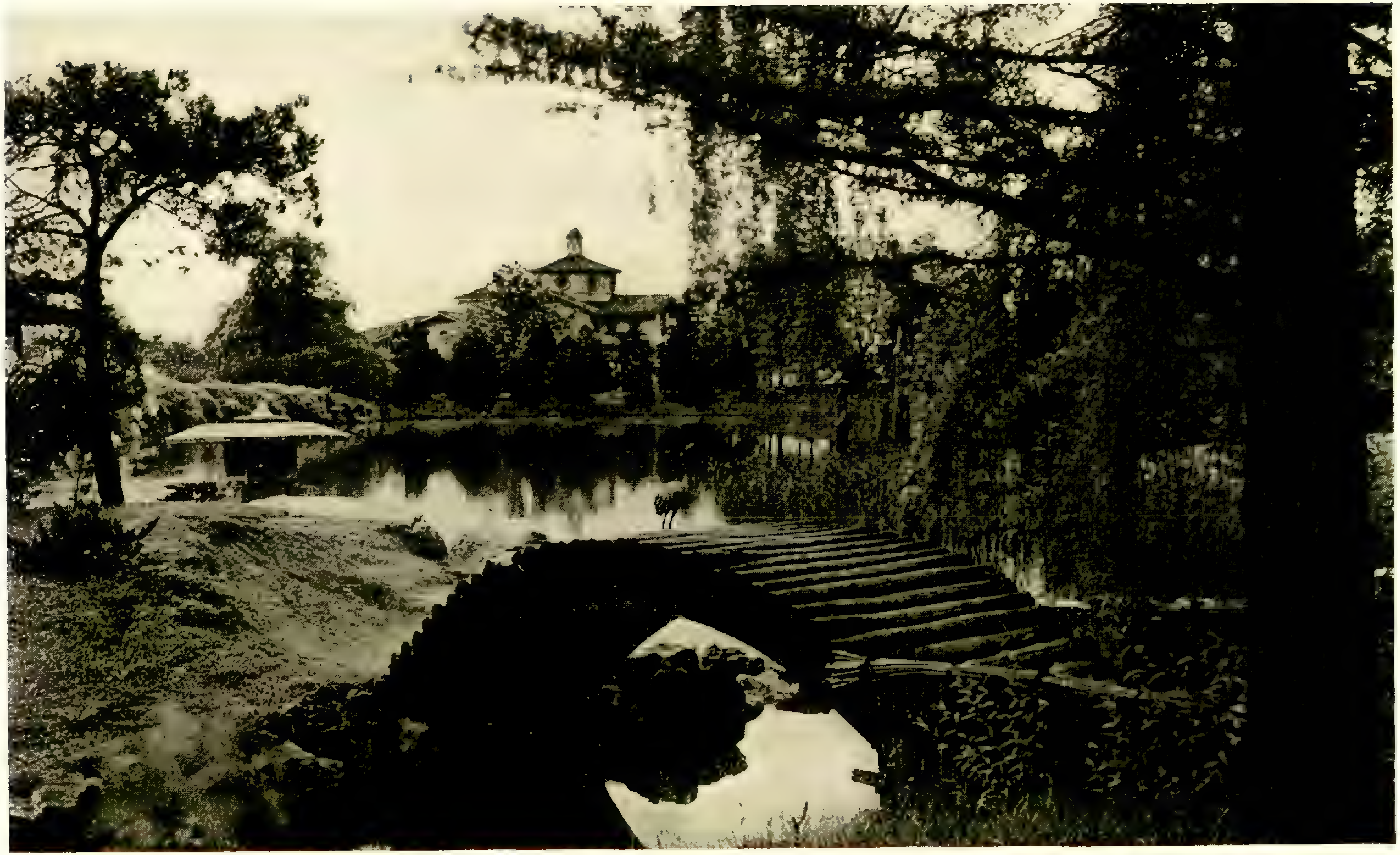


FIG. 1. View in Japanese Garden showing the Drum Bridge, one of the stone lanterns, the storks, and the Laboratory Building in the distance. (4092.)

BROOKLYN BOTANIC GARDEN RECORD

VOL. XVIII JULY, 1929 NO. 4

# PUBLIC EDUCATION
# AT THE
# BROOKLYN BOTANIC GARDEN
# 1910–1928

By C. Stuart Gager, *Director*

## Preliminary Statement

"*For the giving of instruction in botany to the residents of the City of New York.*"[1]

The following pages contain a brief survey and report of the public educational work of the Brooklyn Botanic Garden with some attempt to set forth the fundamental principles upon which it is founded. The educational program includes anything scientific or educational based upon plant life.

The Botanic Garden Record for July, 1927, contained a report on *Research at the Brooklyn Botanic Garden, 1910–1927.* Investigation is fundamental to all education since it is the source of all knowledge.

Public education is the most important activity in which a botanic garden can engage, just as education, by and large, is the most important function of civilized society. Of what use to extend the borders of knowledge if the new knowledge is not made available to the public? Knowledge is power only when put into circulation, otherwise it is only potential energy, producing no results.

---

[1] *Agreement* of 1909 between the City of New York and the Brooklyn Institute of Arts and Sciences concerning the establishment of the Brooklyn Botanic Garden. Paragraph Fourth. The quotation on the front cover page is from the Laws of New York, 1897. Chapter 509. Section 1.

From the beginning, the activities of the Brooklyn Botanic Garden have included both research and education. The second member of staff (after the director) to be appointed (in 1912) was a curator of public instruction, the first being a curator of plants. The third member appointed was an assistant curator (later curator) of elementary instruction.

## For the Advancement of Botany and the Service of the City

The educational program of the Garden has been developed along two main lines.

1. Service to the City.
2. Service to botanical science and education in the broadest sense.

### *Service to the City*

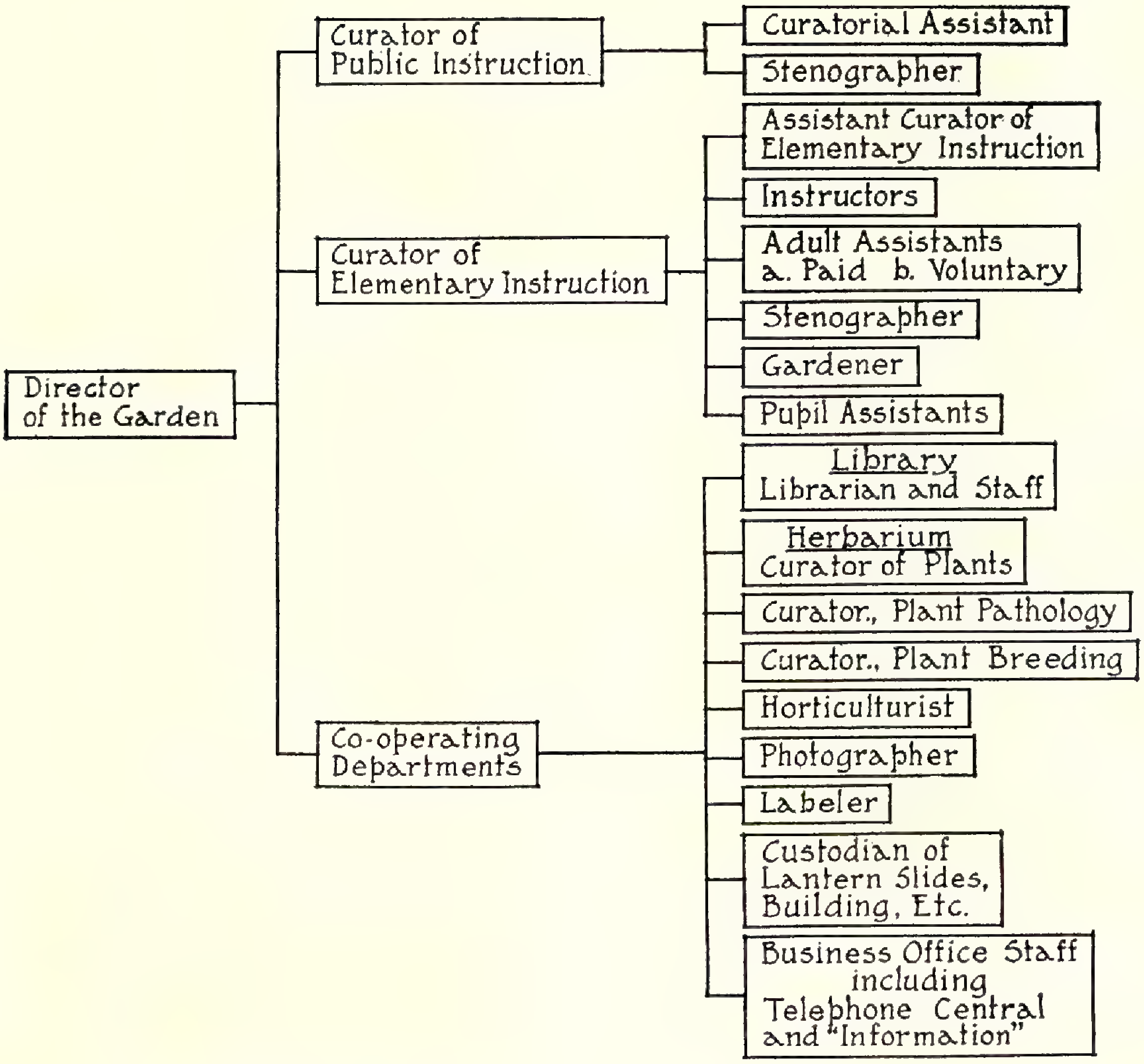
Since the Botanic Garden receives part of its annual support from the Tax Budget of the City, and occupies city owned buildings and grounds, it is only fitting and proper that the Garden should endeavor to render as large a service as possible to the local community.

### *Needs Peculiar to a City*

One who has had his elementary and high school education in a village or small city, or who has passed most of his adult life in such an environment, can hardly appreciate the limitations and handicaps with which a large city of several million inhabitants surrounds both children and adults in the matter of contact with nature. Dwellers in small towns can hardly appreciate the fact that there are literally thousands of children in large cities who have never roamed through fields and over hills; who have never picked wild flowers where picking did no harm; who have never seen fruit and vegetables growing; who have never seen anyone working in a garden. The limitations of knowledge of a city bred child, concerning such matters, are almost beyond belief, and these limitations make it necessary, in a city community, to provide formal instruction along such lines on a much more extensive scale than would be necessary in village or country. The larger the city the greater the need.

# BROOKLYN BOTANIC GARDEN

## PUBLIC INSTRUCTION PERSONNEL


Director of the Garden
Curator of Public Instruction
Curatorial Assistant
Stenographer
Curator of Elementary Instruction
Assistant Curator of Elementary Instruction
Instructors
Adult Assistants a. Paid b. Voluntary
Stenographer
Gardener
Pupil Assistants
Co-operating Departments
Library Librarian and Staff
Herbarium Curator of Plants
Curator, Plant Pathology
Curator, Plant Breeding
Horticulturist
Photographer
Labeler
Custodian of Lantern Slides, Building, Etc.
Business Office Staff including Telephone Central and "Information"

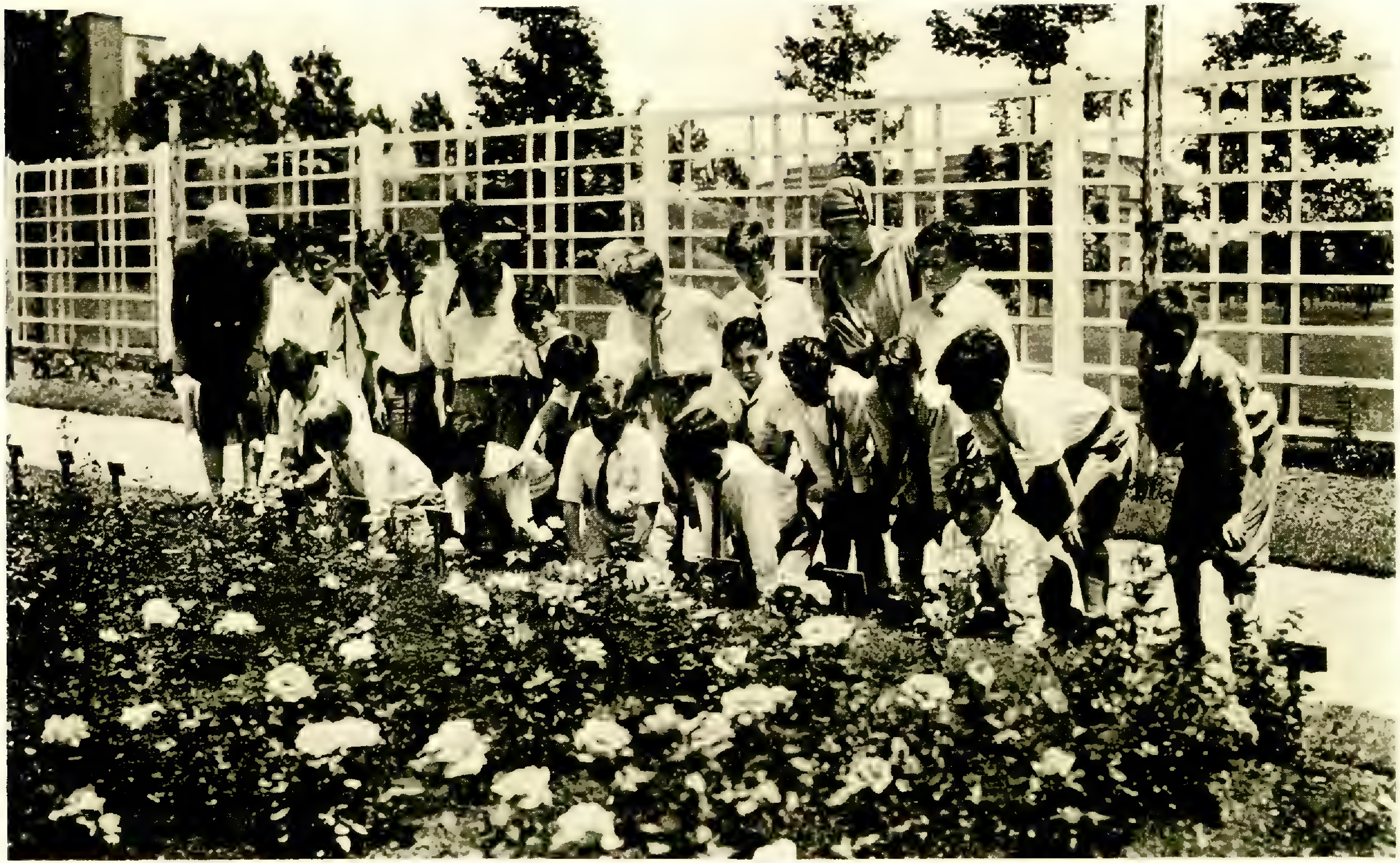


Fig. 2. A well-labeled bed in the Rose Garden. The class studying the roses is from Public School 206, Brooklyn. June 25, 1927. (6516.)

### *World Service*

But no institution can render the largest service to its community by remaining local or parochial in its activities and influence. Just as the Botanic Garden owes its existence and maintenance in part to municipal support and is thereby obligated to the City, so, also, every community is under continued indebtedness to the rest of the world, and should contribute in every possible way to the public well-being.

The scientific and educational work of the Brooklyn Botanic Garden has, from the beginning, been developed with these fundamental considerations in mind. Some of the work is unique. In several directions we have had to blaze new trails.

Public response to the opportunities here offered has demonstrated beyond any possibility of question a great public need and the value of such work. If these results shall stimulate the development of similar work in other centers, its success here will be enhanced many fold and will be doubly gratifying to the authorities of the Brooklyn Botanic Garden.

## OUTLINE OF EDUCATIONAL ACTIVITIES

### Service to the City

*I. To the schools:*

- *a.* At the Botanic Garden.
    - 1. Maintenance of labelled collections of living plants, in plantations and conservatories to which teachers may bring or send pupils for study.
    - 2. Teaching of school classes in
        - Classrooms.
        - Laboratories.
        - Instructional Greenhouses.
        - Conservatories.
        - Plantations.
    - 3. Lectures to pupils and teachers, illustrated by
        - Motion pictures on plant life.
        - Stereopticon.
        - Living plants.
    - 4. Consultation and Conferences with teachers.

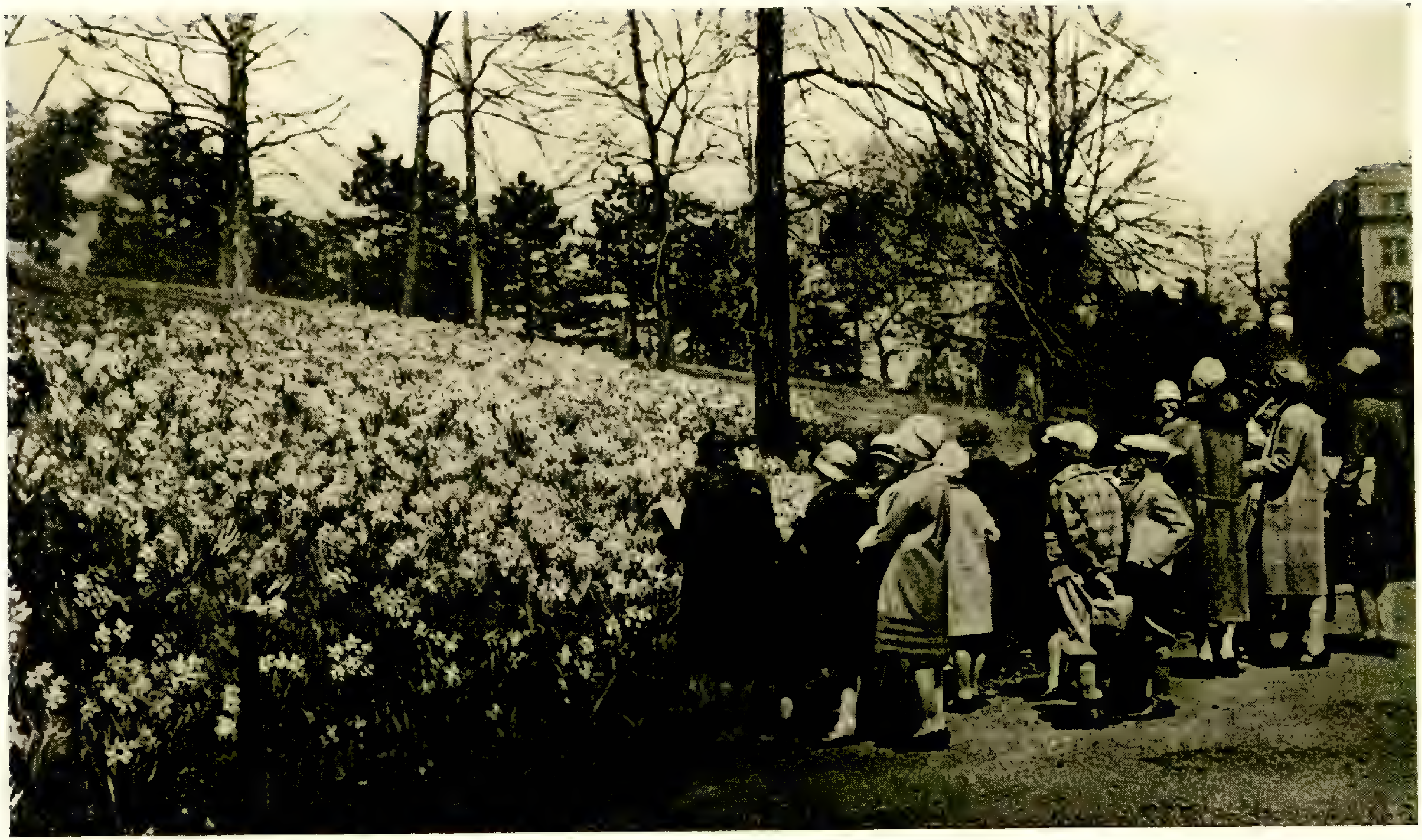


Fig. 3. Class from a private school studying daffodils in the lawn. April 24, 1927. "He is happiest who hath power to gather wisdom from a flower." (P. & A. Photo.)

# BROOKLYN BOTANIC GARDEN

## ORGANIZATION OF EDUCATIONAL WORK

- *b*. At the Schools.
    1. Lectures and addresses by members of the Garden Staff.
    2. Model lessons.
    3. Loan lectures, including lantern slides and lecture text.
    4. Supply of study material.
    5. Supply of Penny Packets of Seeds for planting in school and home gardens.
    6. Children's Horticultural Exhibition or Fair.
    7. Inspection of school gardens.
    8. Temporary exhibits.

*II. To Members:*

- *a*. Expert advice on all aspects of plant life and gardening
- *b*. Services of docent without charge.
- *c*. Special exhibits and events.
    1. Annual spring inspection.
    2. Numerous "Flower Days," according to season.
- *d*. Copies of various Botanic Garden publications.
- *e*. Frequent announcement cards concerning plants in flower, and other exhibits.
- *f*. Identification of botanical specimens.
- *g*. Special automobile privileges in the grounds.
- *h*. Free admission to all lectures and classes.
- *i*. Privileges of the Library and Herbarium.
- *j*. Participation in the periodical distribution of duplicate plants and seeds.

*III. To the General Public:*

- *a*. Plantations, including hardy plants, both native and exotic.
    - Horticultural plants.
    - Various types of gardens.
- *b*. Conservatories, containing
    - Tender and tropical plants.
    - Economic plants not hardy.
- *c*. Lectures, free to the Public.
    1. At the Botanic Garden.
        - To children.
        - To adults.

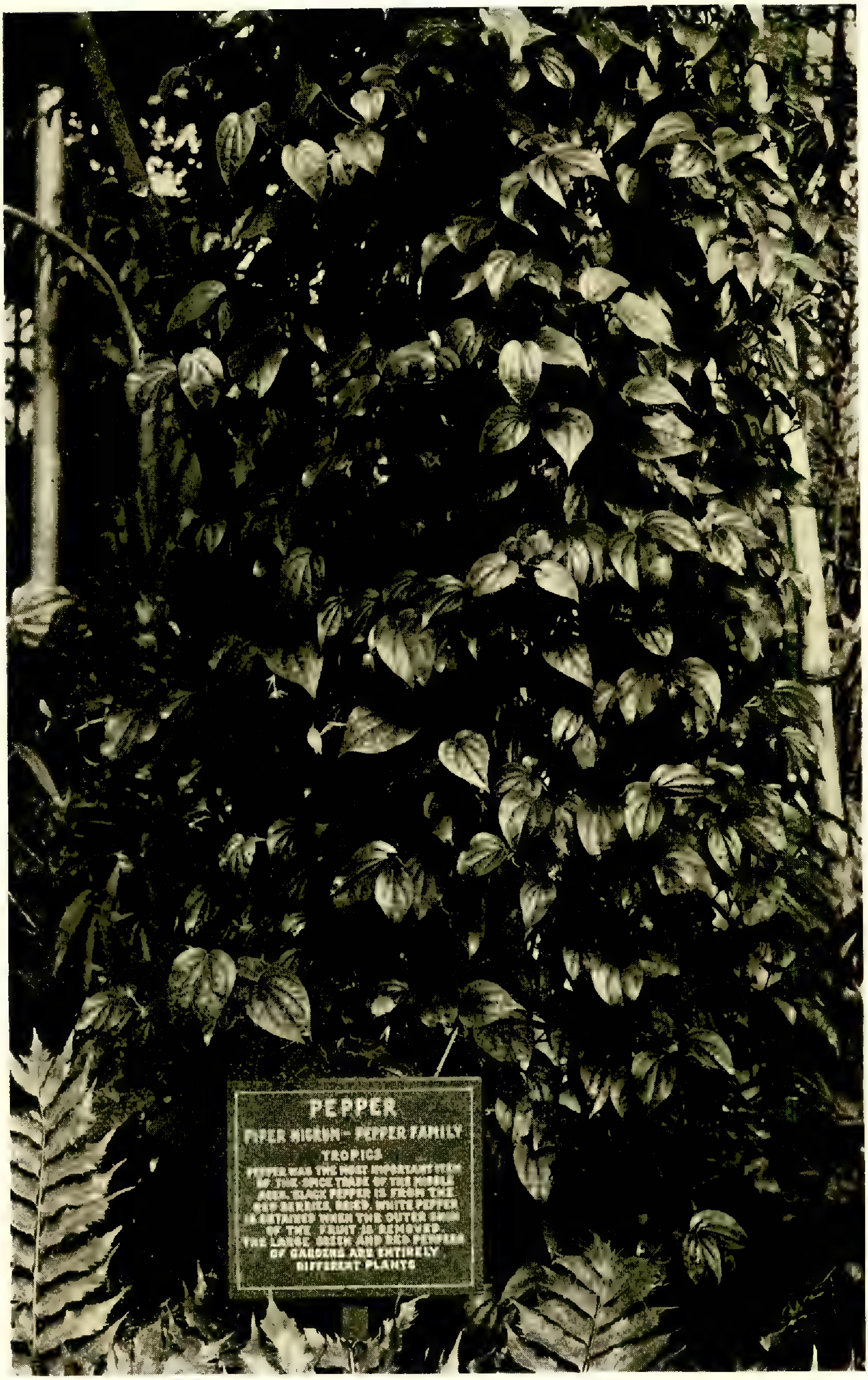


FIG. 4. Story label on Pepper plant (*Piper nigrum*) in the Economic House of the conservatories. (6786.)

2. Extra-mural lectures.
    To civic, educational, and scientific organizations, garden clubs, etc.

*d.* Courses of instruction. Free to members; a nominal fee to non-members.

*e.* Children's Gardens.

*f.* Boys and Girls Club.

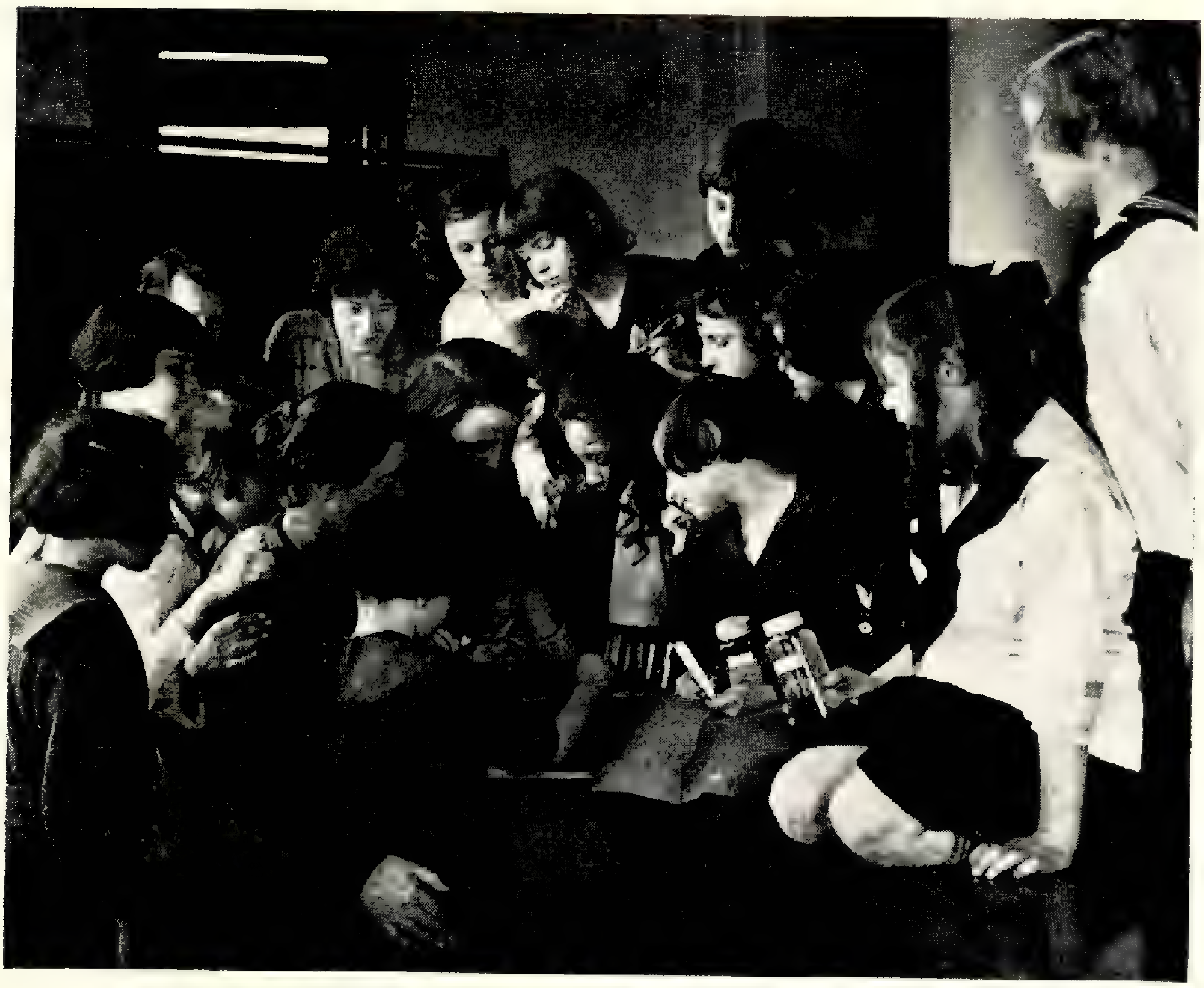


Fig. 5. Intimate relation between teacher and pupils, here illustrated, yields educational results not easily obtained by lecturing to large groups. March 21, 1923. (4474.)

*g.* Docentry. Teaching guides available, by appointment, to conduct parties through the conservatories and grounds.

*h.* Bureau of Information.
  (1) Answers to inquiries on all aspects of plant life and gardening.
    By correspondence.

            By telephone.
            By personal conference.
        (2) Publicity concerning Botanic Garden Activities.
            By weekly press "releases" to local papers.
            By bulletins, posted and mailed.
            By broadcasting.

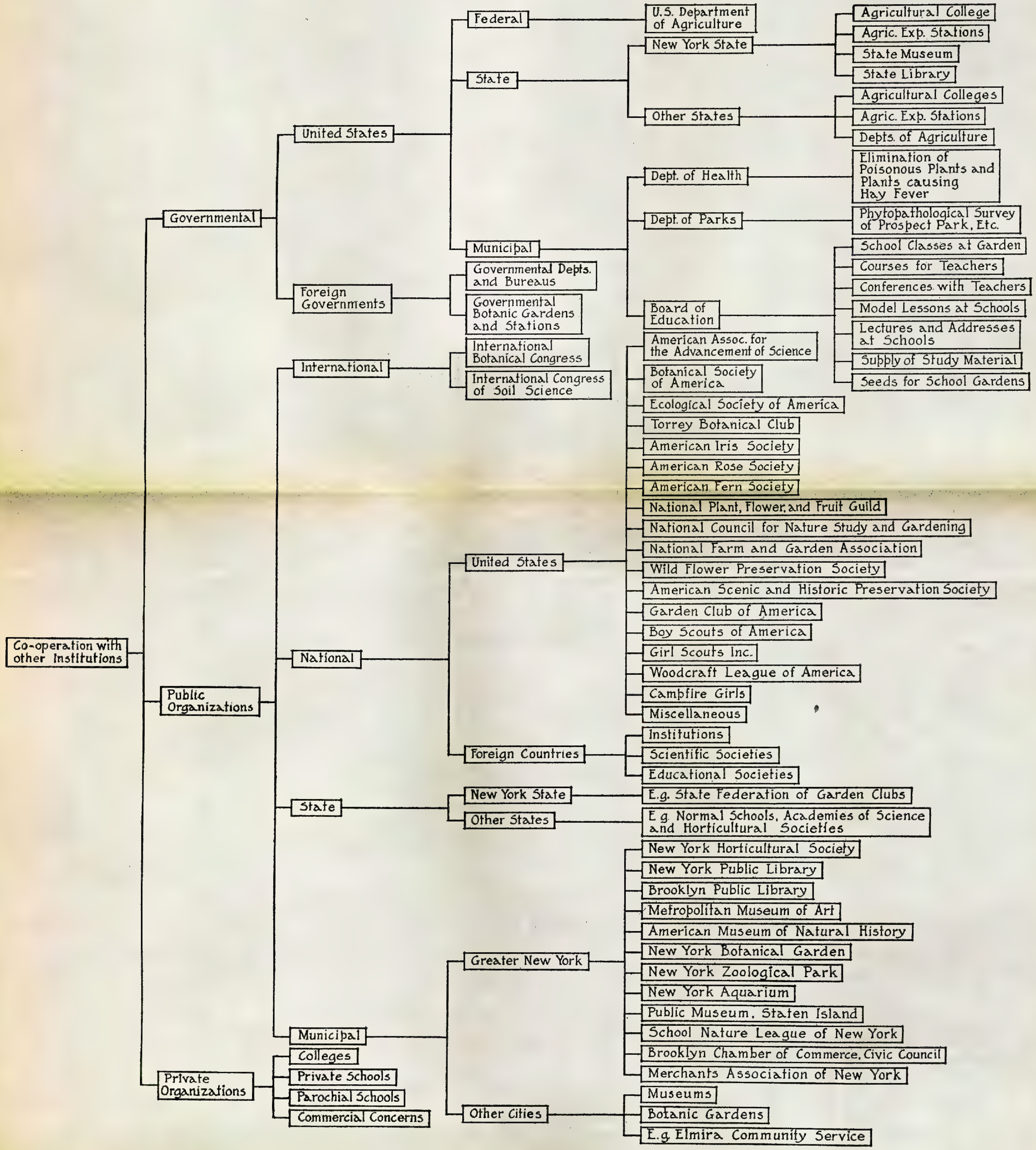
- *i.* Inspection of yards and gardens.
- *j.* Library, open free to the public daily.
- *k.* Herbarium, accessible for consultation daily.
- *l.* Cooperation with City Departments:
    - Department of Parks.
    - Department of Health.
    - Department of Education (as noted above).
- *m.* Cooperation with local organizations, such as,—
    - Garden Clubs.
    - Torrey Botanical Club.
    - New York Horticultural Society.
    - Department of Botany, Brooklyn Institute of Arts & Sciences.
    - New York Association of Biology Teachers, Etc.
- *n.* Public exhibits at the Garden and elsewhere.
- *o.* Conservation activities.
    - (1) Publication of Conservation literature.
    - (2) Cooperation with other organizations in securing the enactment of state laws for the protection of native America plants.
    - (3) Lectures and broadcasting on the general subject of conservation.
    - (4) Propagation at the Garden and distribution of native American plants in danger of extinction.
    - (5) Cooperation in the establishment of wild flower preserves or "sanctuaries."

### World Service

1. Botanical Publications:
    - *a.* Technical.
    - *b.* Popular.
    - *c.* Administrative.

# BROOKLYN BOTANIC GARDEN

## CO-OPERATION WITH OTHER INSTITUTIONS



- Co-operation with other Institutions
  - Governmental
    - United States
      - Federal
        - U.S. Department of Agriculture
      - State
        - New York State
          - Agricultural College
          - Agric. Exp. Stations
          - State Museum
          - State Library
        - Other States
          - Agricultural Colleges
          - Agric. Exp. Stations
          - Depts. of Agriculture
      - Municipal
        - Dept. of Health
          - Elimination of Poisonous Plants and Plants causing Hay Fever
        - Dept. of Parks
          - Phytopathological Survey of Prospect Park, Etc.
        - Board of Education
          - School Classes at Garden
          - Courses for Teachers
          - Conferences with Teachers
          - Model Lessons at Schools
          - Lectures and Addresses at Schools
          - Supply of Study Material
          - Seeds for School Gardens
    - Foreign Governments
      - Governmental Depts. and Bureaus
      - Governmental Botanic Gardens and Stations
  - Public Organizations
    - International
      - International Botanical Congress
      - International Congress of Soil Science
    - National
      - United States
        - American Assoc. for the Advancement of Science
        - Botanical Society of America
        - Ecological Society of America
        - Torrey Botanical Club
        - American Iris Society
        - American Rose Society
        - American Fern Society
        - National Plant, Flower, and Fruit Guild
        - National Council for Nature Study and Gardening
        - National Farm and Garden Association
        - Wild Flower Preservation Society
        - American Scenic and Historic Preservation Society
        - Garden Club of America
        - Boy Scouts of America
        - Girl Scouts Inc.
        - Woodcraft League of America
        - Campfire Girls
        - Miscellaneous
      - Foreign Countries
        - Institutions
        - Scientific Societies
        - Educational Societies
    - State
      - New York State
        - E.g. State Federation of Garden Clubs
      - Other States
        - E.g. Normal Schools, Academies of Science and Horticultural Societies
    - Municipal
      - Greater New York
        - New York Horticultural Society
        - New York Public Library
        - Brooklyn Public Library
        - Metropolitan Museum of Art
        - American Museum of Natural History
        - New York Botanical Garden
        - New York Zoological Park
        - New York Aquarium
        - Public Museum, Staten Island
        - School Nature League of New York
        - Brooklyn Chamber of Commerce, Civic Council
        - Merchants Association of New York
      - Other Cities
        - Museums
        - Botanic Gardens
        - E.g. Elmira Community Service
  - Private Organizations
    - Colleges
    - Private Schools
    - Parochial Schools
    - Commercial Concerns

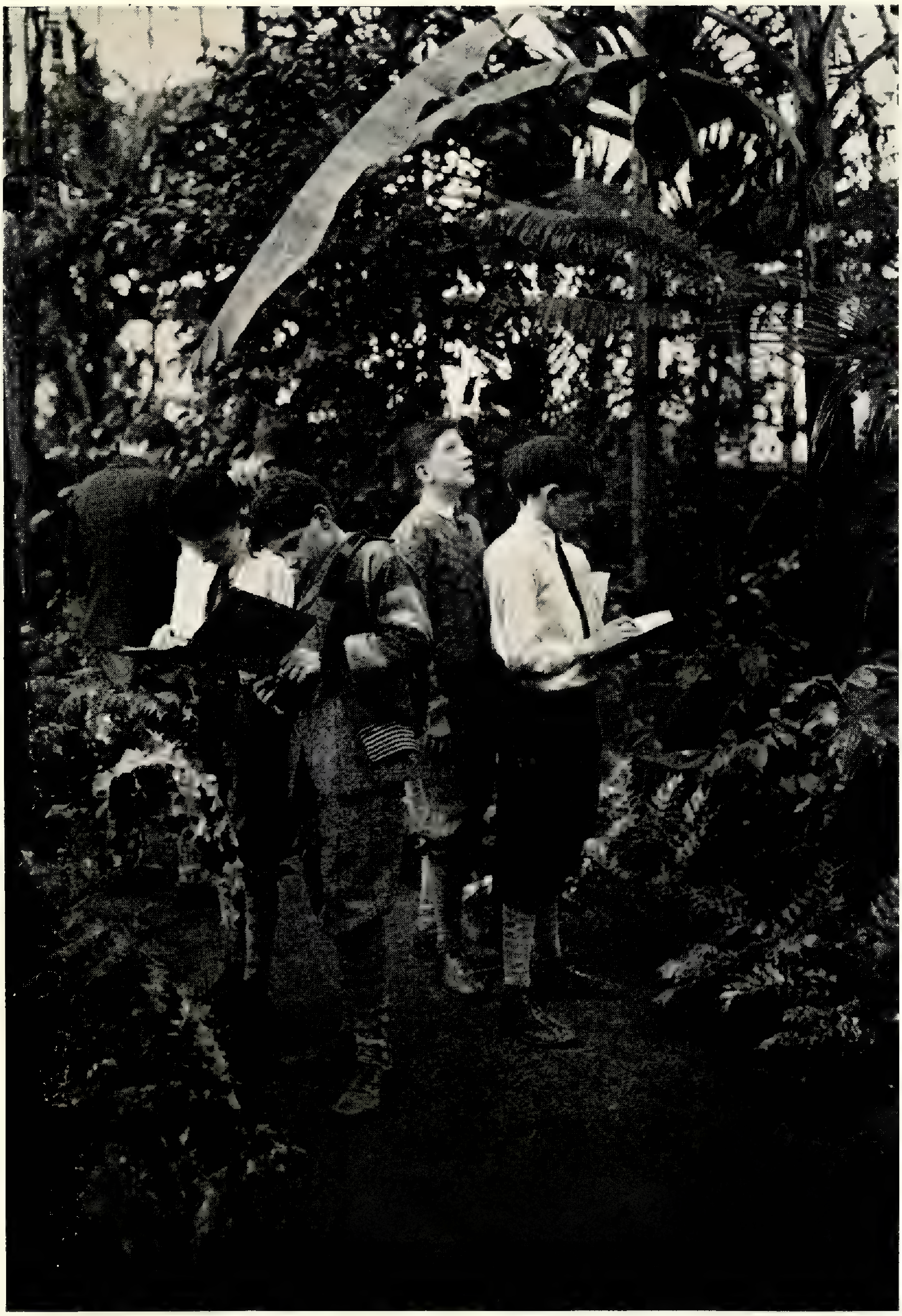


FIG. 6. Part of a school class studying Economic Plants in the conservatories. (6405.)

2. Exchange of seeds with other botanic gardens of this and and foreign countries.
3. Bureau of information:
   - *a.* Answering inquiries.
   - *b.* Press releases to Associated Press.
   - *c.* Advertising.
4. Cooperation with national and international organizations, such as

   International Botanical Congress.
   International Congress of Soil Science.
   Botanical Society of America.
   Ecological Society of America.
   Editorial Board of *Genetics.*
   American Fern Society.
   American Iris Society.
   National Plant, Flower and Fruit Guild.
   Wild Flower Preservation Society, Etc.

The organization of the educational work of the Garden is shown diagrammatically in the folded chart facing page 194. The public instruction personnel is indicated on the chart on page 191. The nature and conduct of this work will be set forth in more detail in the following pages.

## SERVICE TO THE CITY

### I. To the Schools

### *a. At the Botanic Garden* (Cf. *b,* p. 212)

### 1. Studying the Plantations

**The grounds** of the Botanic Garden are so planned as to constitute an outdoor museum. It is this which chiefly differentiates a botanic garden from a park. In a park, the chief or only aim of the planting is to secure a pleasing landscape effect and to afford shade for persons who visit the park chiefly for recreation and rest—to escape from the noise and distractions of the city to the peace and quiet afforded by a bit of the country preserved in the midst of the city.

In a botanic garden the primary aim of the planting is to impart

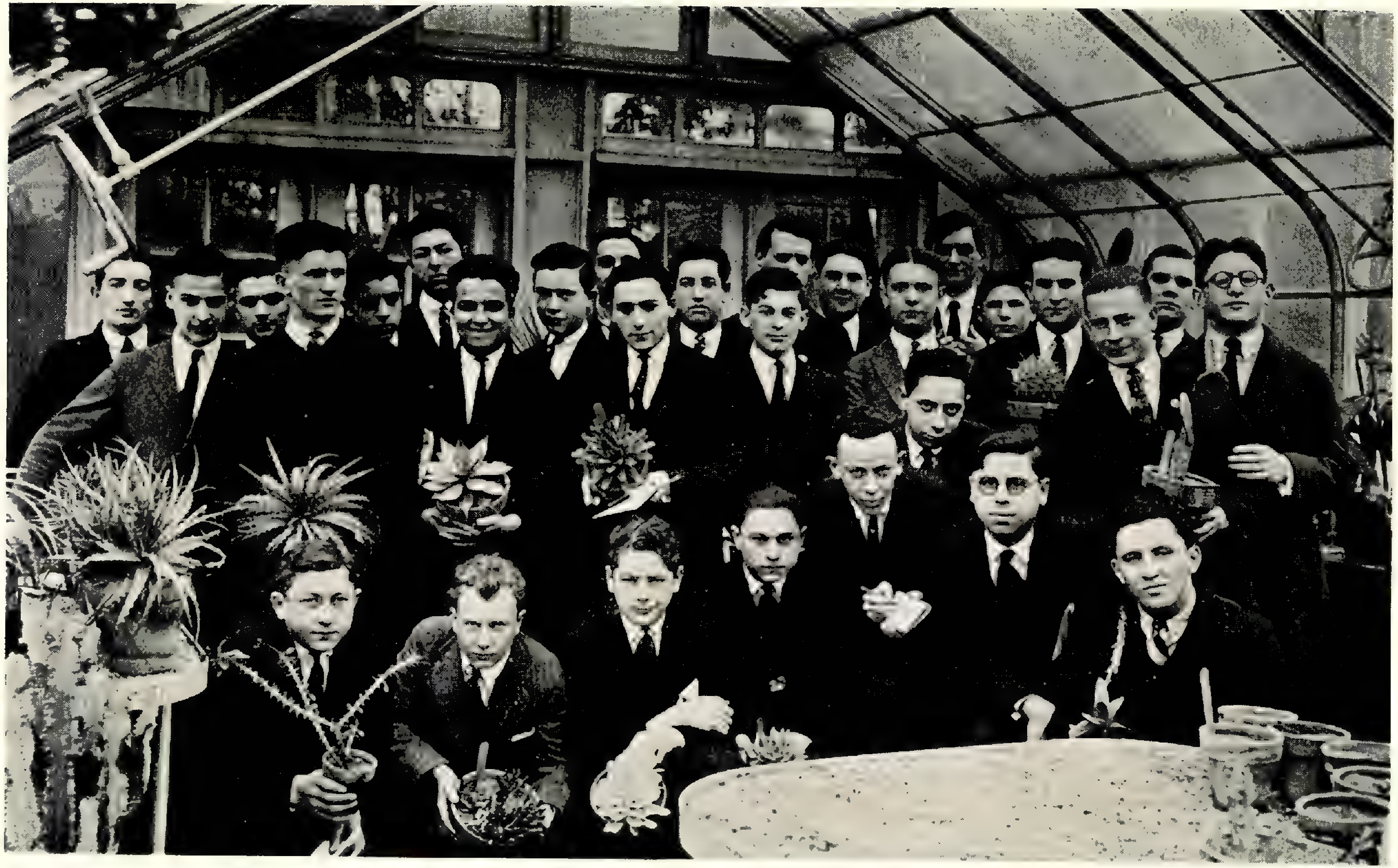


FIG. 7. Biology class, with teacher, from Stuyvesant High School, studying succulents in Conservatory House No. 6. 1923. (3916.)

instruction concerning plant life, just as the primary aim of the various exhibits in a natural science museum (bird groups, invertebrate groups, etc.) is to give instruction in some branch of natural science. The first consideration is to have a rich representation of the different kinds of plants from all parts of the world, arranged so as to illustrate some aspect of botanical science, such as geographical distribution, relation to environment, the natural families of plants and their sequence, *et cetera.*

### *The Educational Value of Beauty*

With these limitations, the aim must never be lost sight of to make the plantations as beautiful as possible, for beauty itself is an educational force not second, by any means, to a knowledge of structure, function, and relationships. A botanic garden, therefore should exemplify, in its planting, the utilization of plants for aesthetic effect in the planting of streets, parks, homegrounds, and otherwise.

The ideal is to make the Brooklyn Botanic Garden the most beautiful spot in the city. No more important educational service could be rendered to pupils in our schools than to provide, easy of access, a park or garden of rare beauty. If to this we add the botanical features above mentioned, we have in a botanic garden an educational instrument unique in kind, and not surpassed in importance by any educational equipment.

### *The Importance of Labels and Guides*

As in the case of any museum, the "exhibits" in a botanic garden must be effectively labeled, and the labels should be supplemented with maps and guide books.

Moreover, teaching guides or docents must be provided to facilitate the study of the collections by classes brought to the Garden by their teachers.

The grounds of the Brooklyn Botanic Garden have been laid out with the above considerations in mind. Their use by classes, as well as by individuals and informal groups, increases each year —not only classes of botany, but also of nature study, geography (to study, for example, the Japanese Garden), and art (to draw and paint both individual plants and flowers, or landscapes and intimate views and vistas).

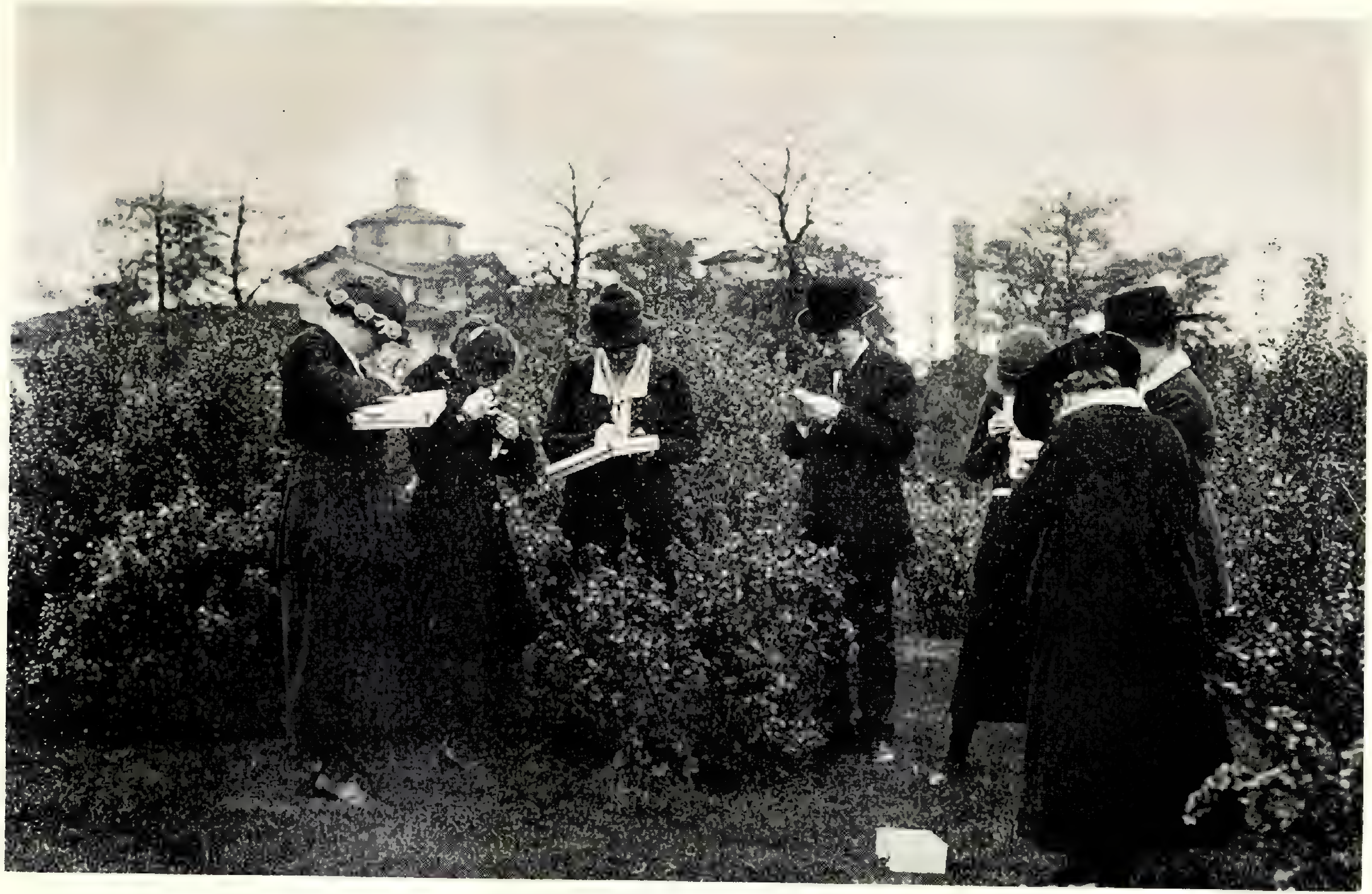


Fig. 8. Teacher's class studying shrubs in the Botanic Garden. 1921. (3690.)

Tens of thousands of school pupils from the age of six or eight to twenty-two or twenty-three come each year, from elementary and high schools, teachers training schools, colleges and universities, public, parochial, and other private schools, mostly in classes accompanied by their teachers.

### *Guide Sheets*

To facilitate an orderly and effective study of the plants, classes are provided by the Garden with Guide Sheets, outlining the group or subject to be studied (Cf. pp. 250–255). These outlines help to insure and enrich the follow-up work and review which the teacher conducts at school, based upon the trip to the Garden. The Garden emphasizes the fact that a visit to the plantations should be chiefly for the purpose of getting, at first hand, source-material for classroom study and discussion.

### *Importance of Class Trips*

For a teacher to take a class of 40 to 50 or more pupils across the city—the trip usually requiring a ride on the surface cars or subway trains—involves a considerable expenditure of time and effort, and a great responsibility on the part of the teacher, and we feel that the Botanic Garden should do everything possible to make sure that the trip does not turn out to be merely a pleasant (or unpleasant) outing, but that it shall yield the largest possible educational returns. Under no other circumstances can these trips possibly be justified. It is so easy for class visits to botanic gardens and museums to degenerate into merely a lark or an hour's freedom from classroom routine.

At the Botanic Garden the classes are in charge of competent and experienced instructors, able to command the respect and confidence of school principals and regular teachers and, above all else, to interest, inspire, and instruct the pupils. The work cannot be done properly if it is delegated to various members of staff who have little to commend them except that they know plants and happen to be available at the particular hour when the class arrives.

Docentry is an educational process which should not be attempted with children or adolescents except by an experienced

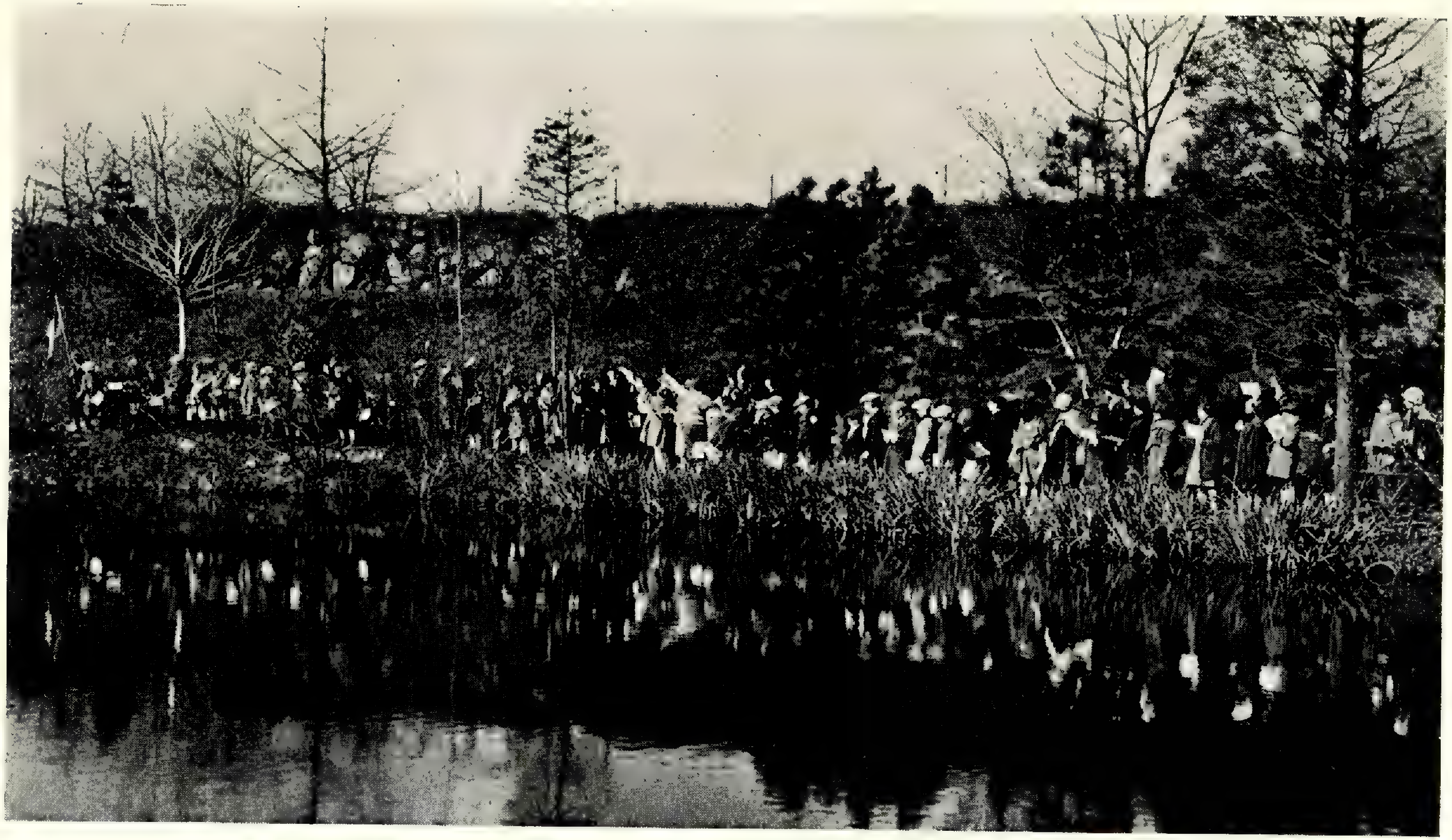


Fig. 9. Classes, comprising 180 pupils from Public Schools, receiving instruction on the Shore of the Lake. The pupils have printed outlines of the lesson in their hands. See p. 204. 1925. (5126.)

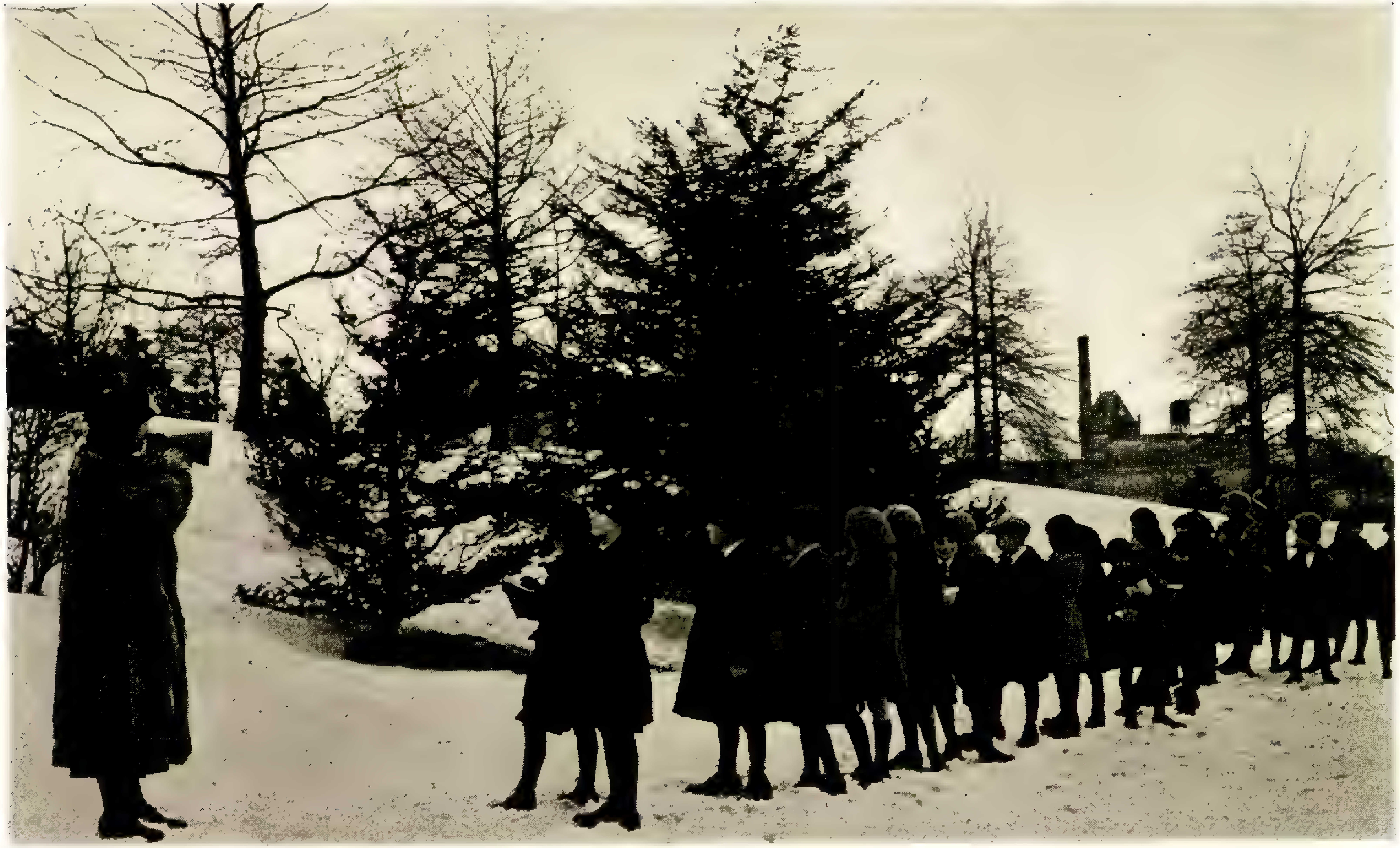


Fig. 10. Class from a public school studying trees in their winter condition. The instructor is using a megaphone. Feb 4, 1924. (5249.)

teacher, of forceful personality, interested in education and in human beings as well as in science.

## 2. Teaching School Classes

The Brooklyn Botanic Garden believes that intensive, quiet work with small groups of pupils gives more satisfactory results than any other method of teaching. Only by this method can information be imparted in a manner to yield the richest educational results. Education and imparting information are not synonymous, and the ultimate aim, in all of our work with the schools, is education.

### *Equipment and Methods*

For the handling of classes the Garden is well equipped with classrooms and laboratories and with a range of three instructional greenhouses. The conservatories are also regularly used for class instruction, as well as the plantations, mentioned under the preceding heading.

Teachers may arrange in advance to bring classes to the Garden and do their own teaching, using the Garden equipment; but most teachers find it more satisfactory to have the lesson given by a member of the Garden Staff—usually a member of the Department of Elementary Instruction or of the Department of Public Instruction.

These lessons serve not only for imparting information to pupils, but also as model lessons of value to the teachers, who are always present as observers.

A common method at the Botanic Garden is to give a preparatory lesson in the classroom, and then follow this up with a demonstration in the conservatories or grounds. Classes are frequently brought from the schools on successive days for a series of related lessons. This plan is particularly satisfactory.

Classroom lessons at the Garden are always richly illustrated with living and preserved plant material, and with charts, pictures and lantern slides. The Botanic Garden instructors always encourage the asking of questions by teachers and pupils and, wherever the subject permits, discussion is encouraged.

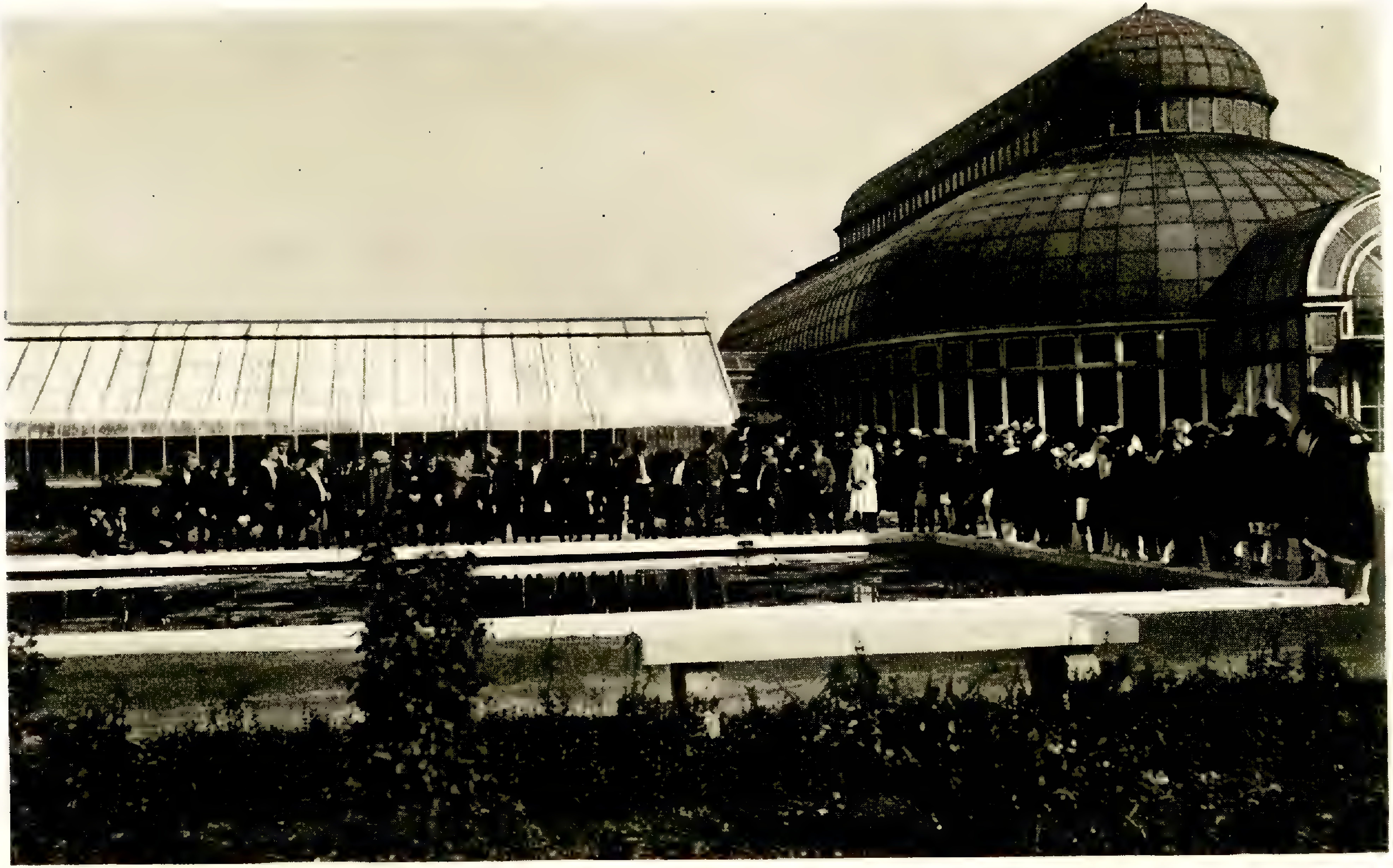


FIG. 11. Nature study classes from public schools, with their teachers, studying water plants in the Conservatory Plaza, preceeding a lecture in the auditorium. Oct. 7, 1920. (3507.)

## 3. Lectures to Pupils and Teachers

### *Limitations of Lectures*

One of the most common methods employed by museums with classes is to give lectures to large audiences of several hundred to a thousand or more children. Another method is the so-called "Story Hour," with smaller groups. Lecturing to large audiences gives impressive attendance figures for annual reports, but, as we have said elsewhere (*Fourteenth Annual Report of the Brooklyn Botanic Garden, 1924,* p. 24), lecturing to large audiences of young children usually yields smaller educational returns than anything one can do with them. The Story Hour has the advantage of more intimate contact with small groups, and should be more effective than lecturers.

### *When Lectures are Effective*

During a lecture or story hour the pupils' minds are more or less passive (so far as the subject of the lecture is concerned!) in contrast to the well conducted class exercise. But, of course, there are occasions when a lecture to fairly large sized audiences of children may be made effective, and may, indeed, seem the only thing to do. The lecture seems justified when the main object is the imparting of information on broad subjects, easily comprehended, and when the stereopticon or motion pictures are to be used. Lectures are frequently given at the Botanic Garden, and a list of some of the subjects may be found on pages 248–249. Our lecture auditorium seats 570, and is sometimes filled several times in one day.

### *Syllabi*

The Botanic Garden is specially interested to stimulate and assist in "follow up" work with classes after they have returned from a visit to the Garden. One method of insuring this, and of helping to make the work definite and accurate, is by providing a syllabus of the given lecture—one for the teacher and one for each pupil. The syllabus may be pasted in the pupil's note book, and aids in oral or written review, or both, as the teacher may determine. By this method the results of the lecture are more definite and substantial; the lecture is less apt to have been chiefly a

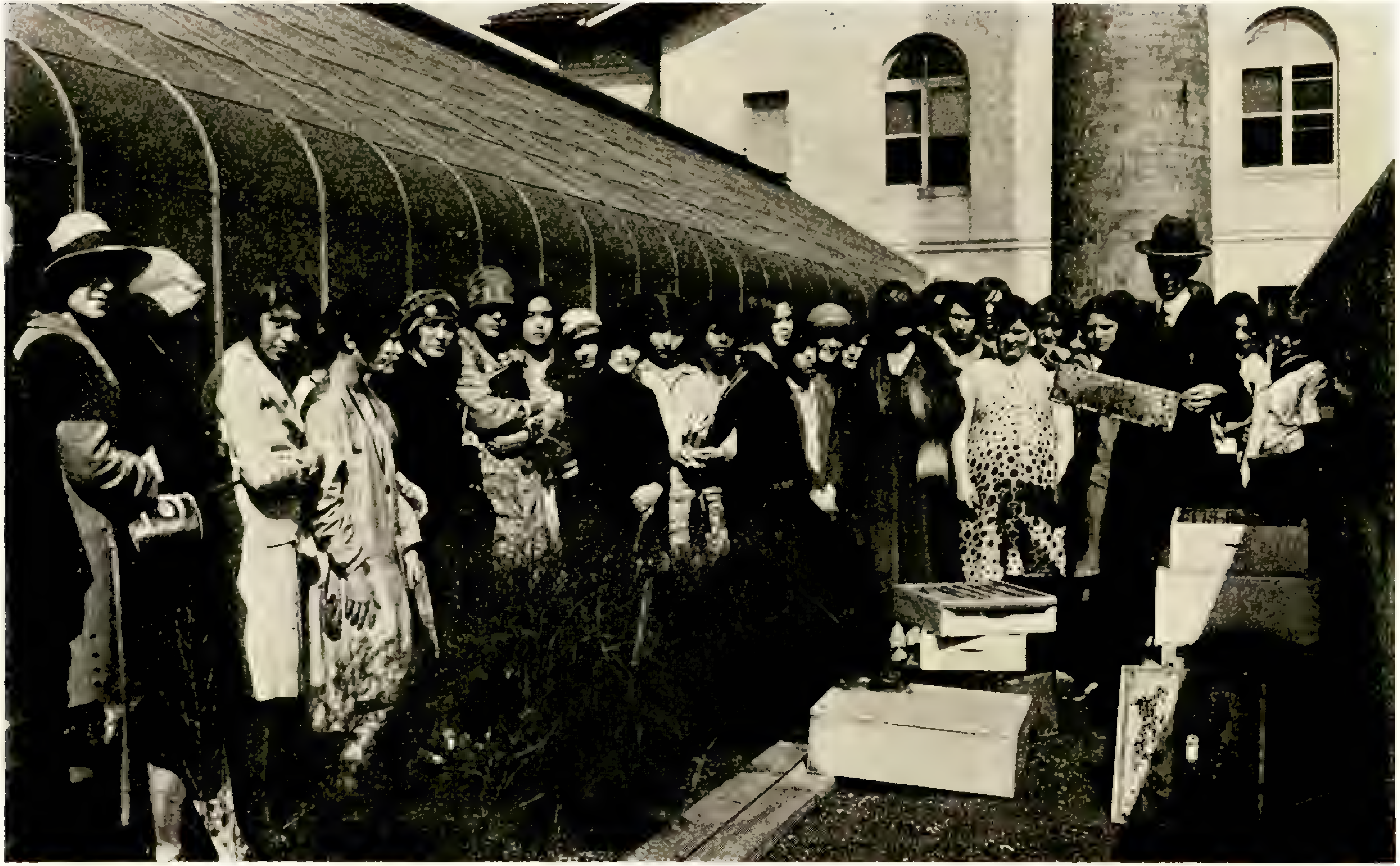


FIG. 12. Beehive demonstration at Brooklyn Botanic Garden before class from Girls' Commercial High School, Brooklyn, Sept. 28, 1926. Several such demonstrations were given during the year. (5984.)

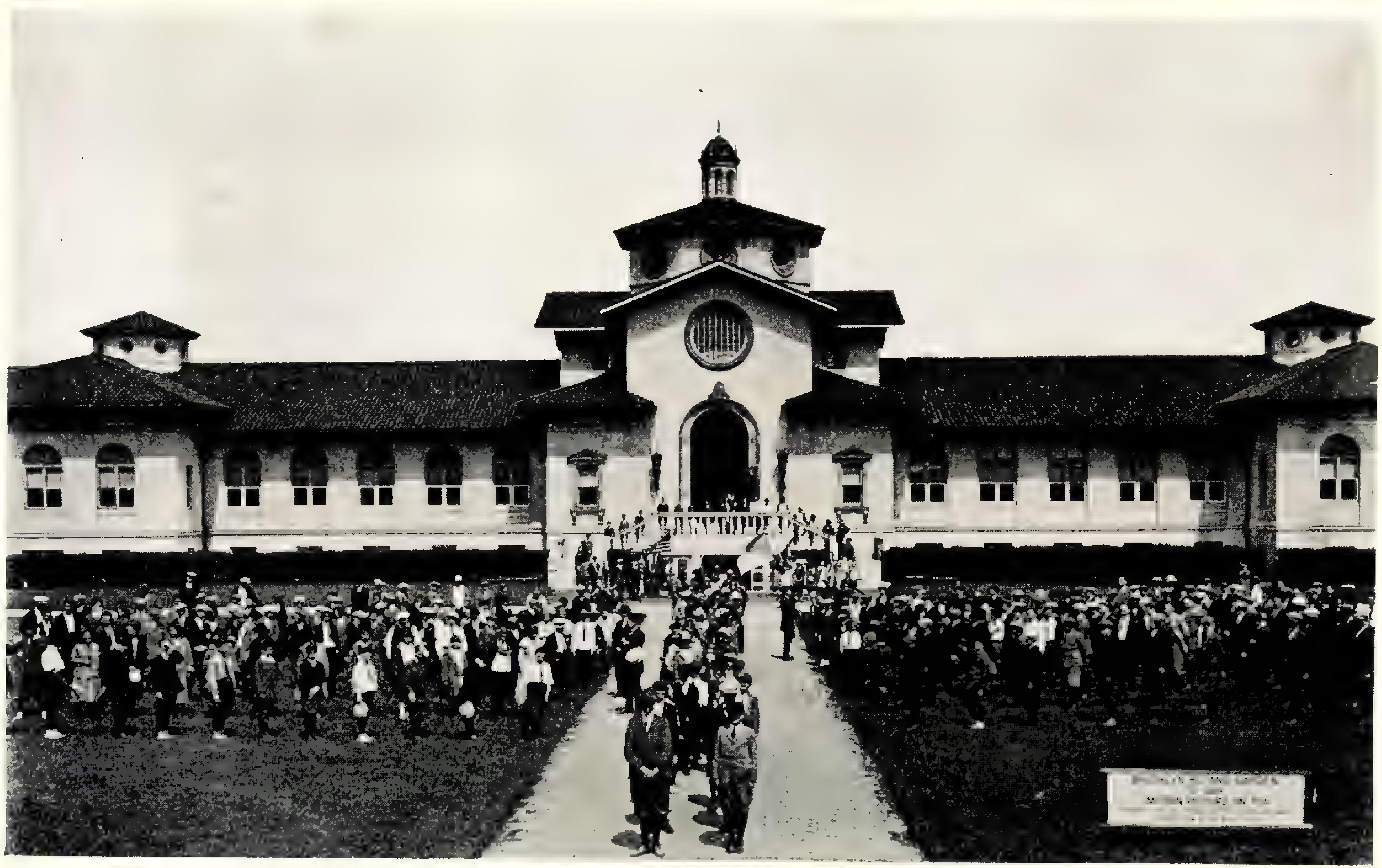


FIG. 13. Public School pupils on arrival to see the motion picture reels on Tea, presented by Sir Thomas Lipton, June 13, 1924. (5111.)

pleasant hour with pictures. Specimen syllabi are given on pages 259–264.

### 4. Consultation and Conferences with Teachers

The Botanic Garden encourages teachers of Nature Study, Botany, and related subjects to confer with members of staff concerning subject matter, method, collateral reading, and all other problems growing out of the daily work in the classroom. The extent to which teachers avail themselves of this opportunity increases and is very gratifying. During 1928, for example, over 1000 teachers held conferences with various members of staff concerning problems affecting 49,600 pupils.

### *b. At the Schools* (Cf. *a,* p. 200)

1. **Lectures, commencement addresses, and talks** to mothers clubs, and students' and teachers' organizations are a regular part of the service which the Garden renders to the schools. During 1928 the number given was 115.

2. **Model lessons** have been given by special request of teachers in the Public Schools. Classes from City Training Schools, University Summer Schools, and other institutions also visit the Botanic Garden to observe our work with classes.

3. **Loan lectures,** including lantern slides and lecture text, are available on the following subjects. Plans are matured for extending this service whenever the necessary funds become available. Pupils call for and return the lantern slides.

1. Plant Life
2. Spring Wild Flowers
3. Common Trees
4. Fall Wild Flowers
5. Forestry (2 Sets)

4. **The Supply of Study Material** is one of the most valued of our services to the schools. In a large city of the size of New York it is much more difficult to secure living plant material than in small cities; the country is less readily accessible, and yet the quantity required is greater on account of the larger number of pupils. The Botanic Garden Brook and Lake yield *Spirogyra, Elodea* and other forms of aquatic life (Protozoa, as well as microscopic plants), the Conservatories afford fern prothallia and other

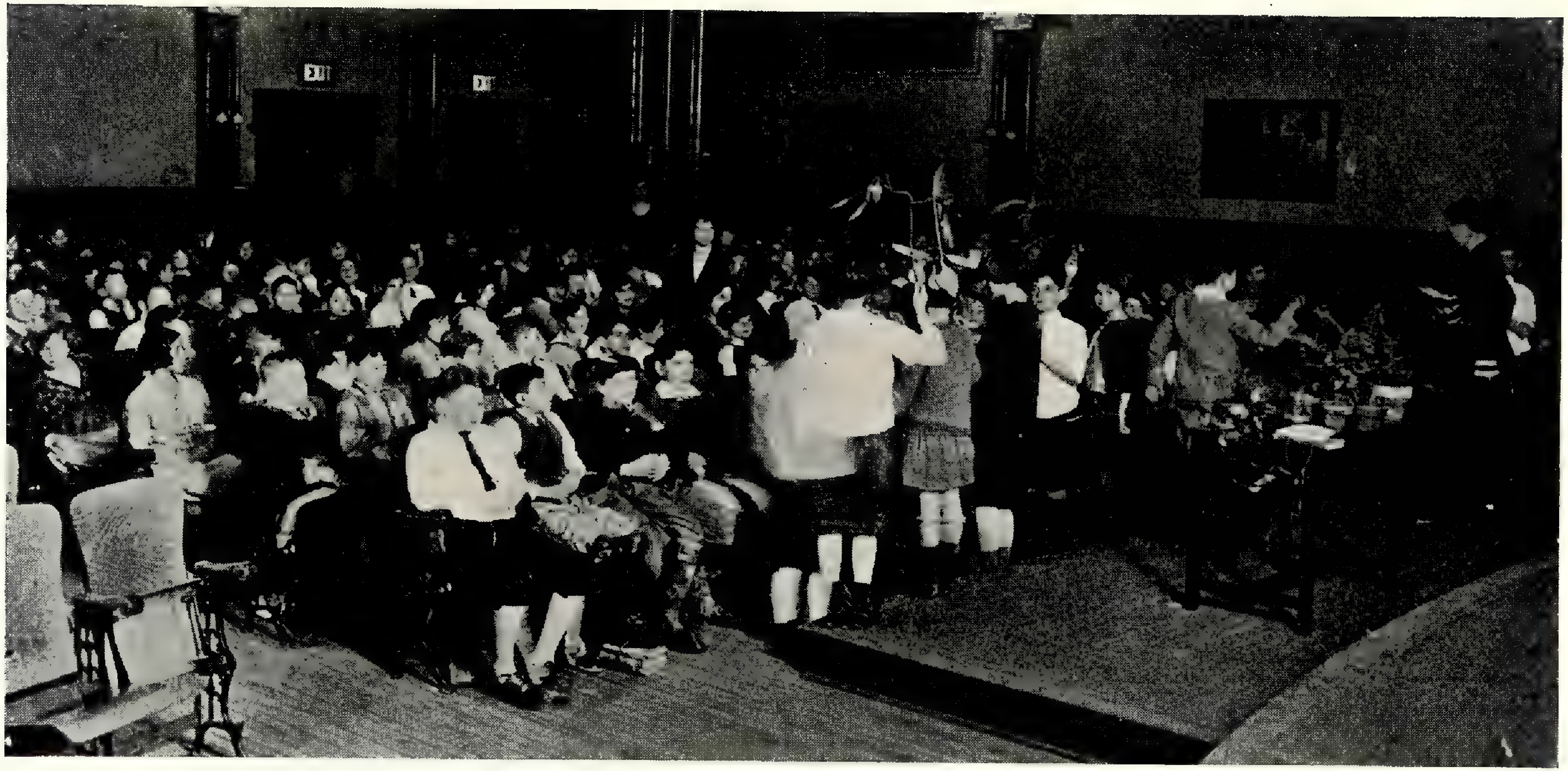


FIG. 14. Model lesson being given to five classes (250 pupils) at Public School 84, Brooklyn, by Botanic Garden Curator of Elementary Instruction. The illustrative plant material was supplied by the Botanic Garden. Jan. 26, 1927. (6053.)

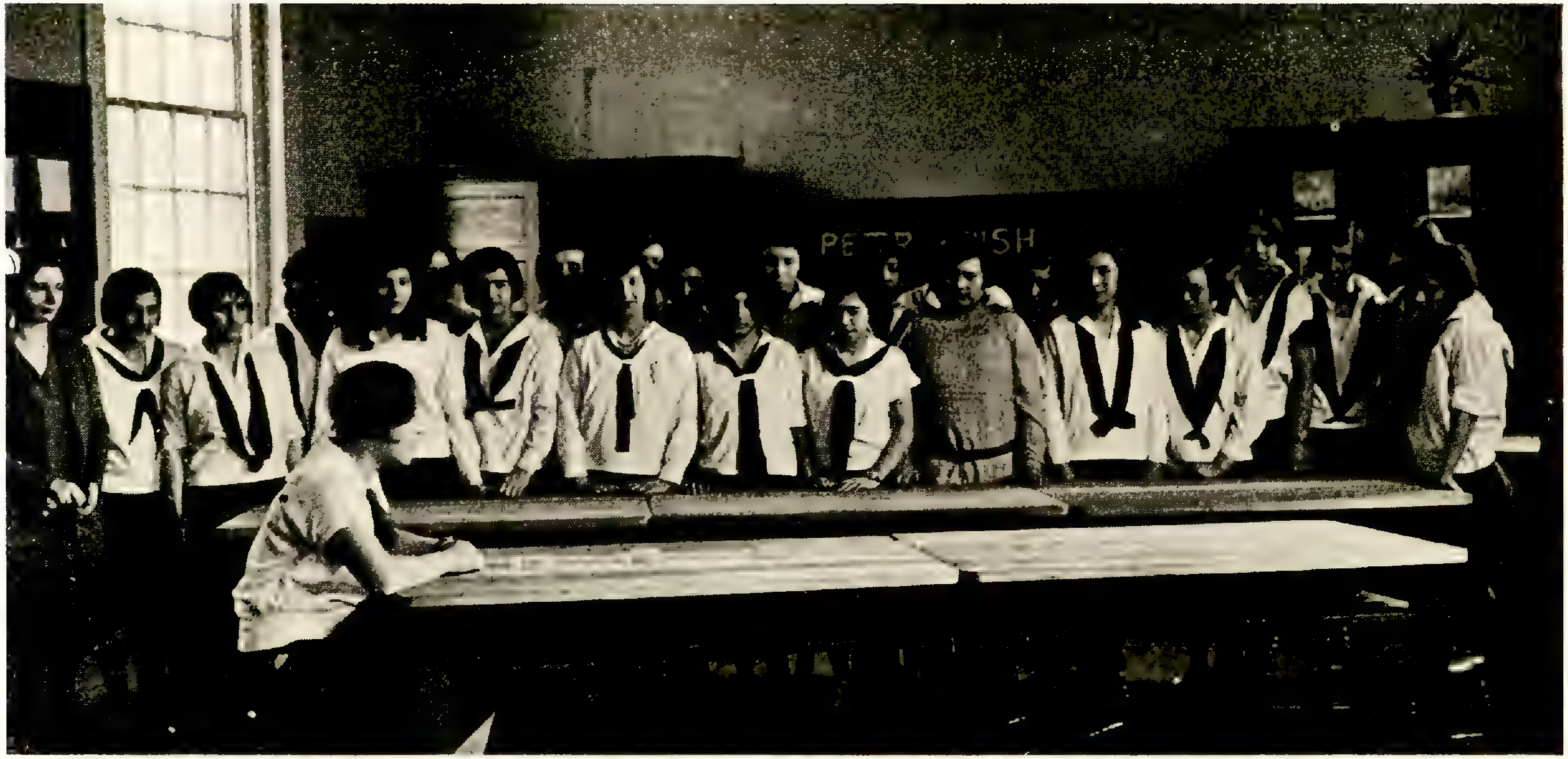


FIG. 15. Classroom experiment in Haaren High School, New York City, to show the effect of a cough carrying bacteria. Pupil at table, who has coughed vigorously, has Petri dishes exposed at equal distances apart on tables in front of her. Petri dishes with sterile agar supplied by Brooklyn Botanic Garden. March 6, 1928. (6483.)

material, and seeds are readily germinated for supplies of seedlings. During 1928 study material was supplied to over 3800 teachers in all five boroughs of Greater New York for the instruction of over 156,600 pupils.

In addition to this, sterilized agar is prepared in Petri dishes and flasks for the study of bacteria and other germ life. This service and the methods of using these preparations in the schools are described in detail in Brooklyn Botanic Garden *Leaflets,* Series XVI, No. 2–3, April 18, 1928, copies of which may be had gratis on request.

5. **Penny Packets of Seeds** are supplied each year to school pupils for planting in their school and home gardens. This service was inaugurated in 1914 when 25,000 packets were supplied. The demand steadily increased until the number supplied in one year (1929) has reached the total of 794,496 packets. (See p. 256–258.)

The seed packets are filled by " our own boys and girls," that is, children who are registered in our classes; and in connection with this the children are taught how to ascertain, by experiment, the percentage of germination as an index to the germinating power of the seeds used. All seeds are tested in this way before being distributed.

6. **Children's Fair.** For twelve years (1914 to 1925, inclusive) the Garden held each fall, in the Laboratory Building, a Children's Horticultural Exhibit of material raised by the children in their school or home gardens. Prizes were given for the best crops. The primary purpose of this exhibit was to stimulate an interest in gardening in city children. By 1925 it became evident that the original object of this exhibit had been largely accomplished, and it was thereafter discontinued.

7. **Inspection of school gardens** is a regular part of the work of the Department of Elementary Instruction. Gardens at children's homes, institutions, and elsewhere are also inspected and advice given as to cultivation of the soil, planting, care of crops, etc.

8. **Temporary Exhibits** of plants and plant products are also placed in the Public Schools from time to time and are viewed by thousands of pupils.

The extent of the Botanic Garden's service to the Schools of

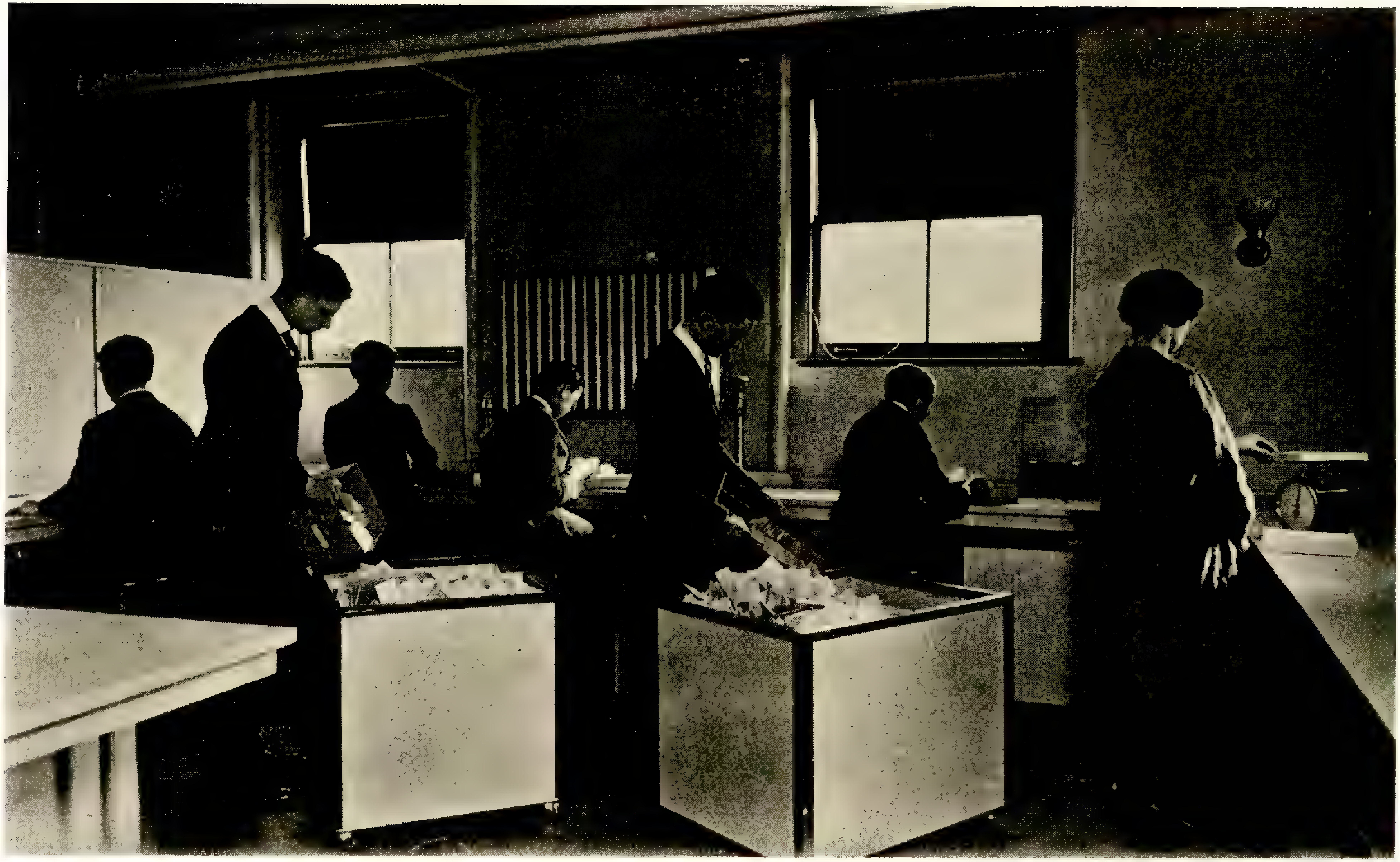


Fig. 16. Penny packets of seeds being prepared for distribution to Brooklyn boys and girls for planting in school and home gardens. All five Boroughs of Greater New York are now included in this service. Over 794,000 packets were supplied in 1929. (4438.)

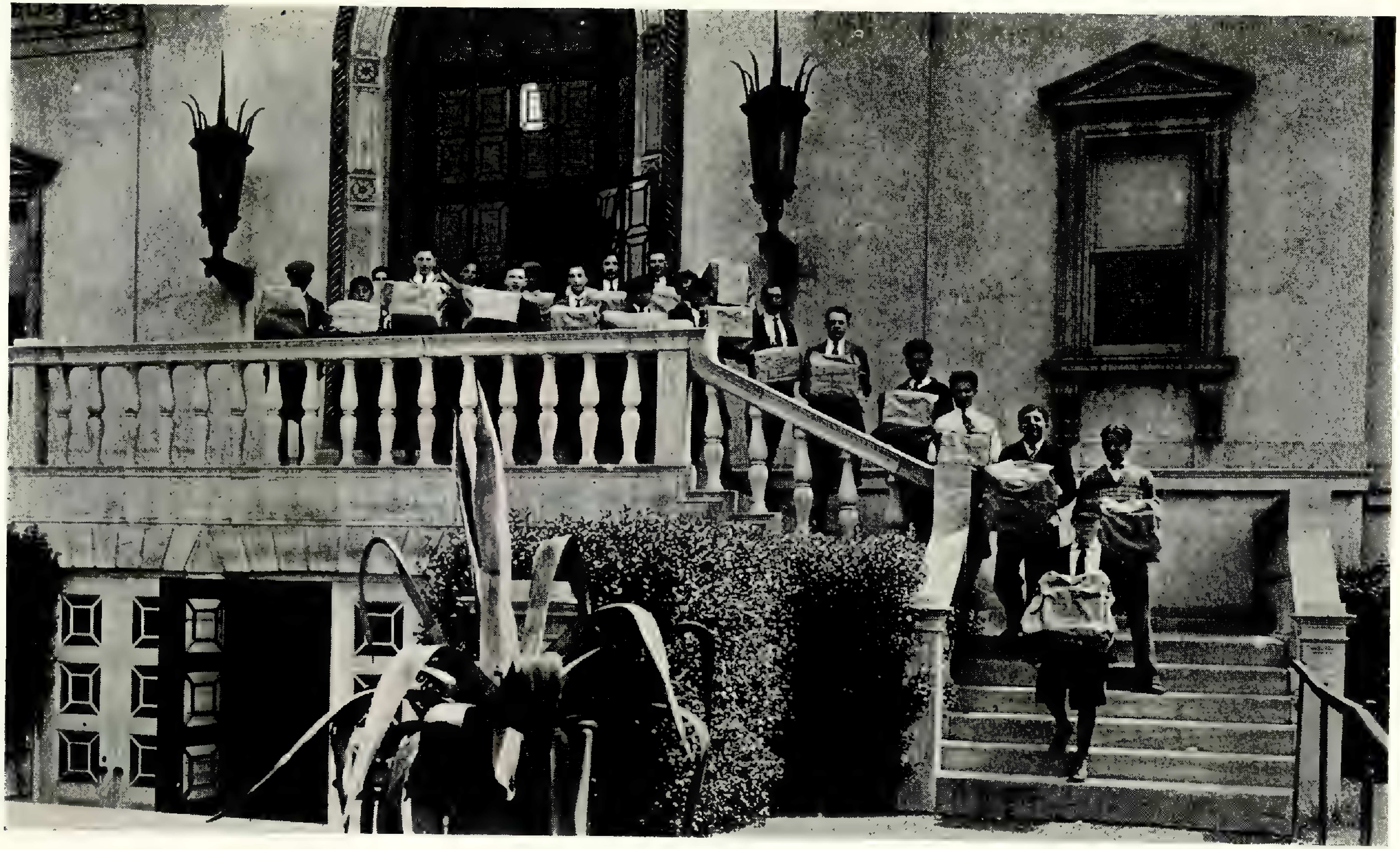


Fig. 17. Penny packets of seeds for school children. Messengers from various Public Schools getting the bundles of seeds ordered by their schools. (5450.)

Brooklyn is shown by the map facing page 220. This service includes schools in all five Boroughs of New York City.

## II. Membership Privileges

In addition to the Botanic Garden's service to the general public, members enjoy special privileges. These are listed on page 195 of this pamphlet. Many persons take out membership, not primarily for the purpose of securing these privileges, but through public spirit—because they believe that the Botanic Garden is

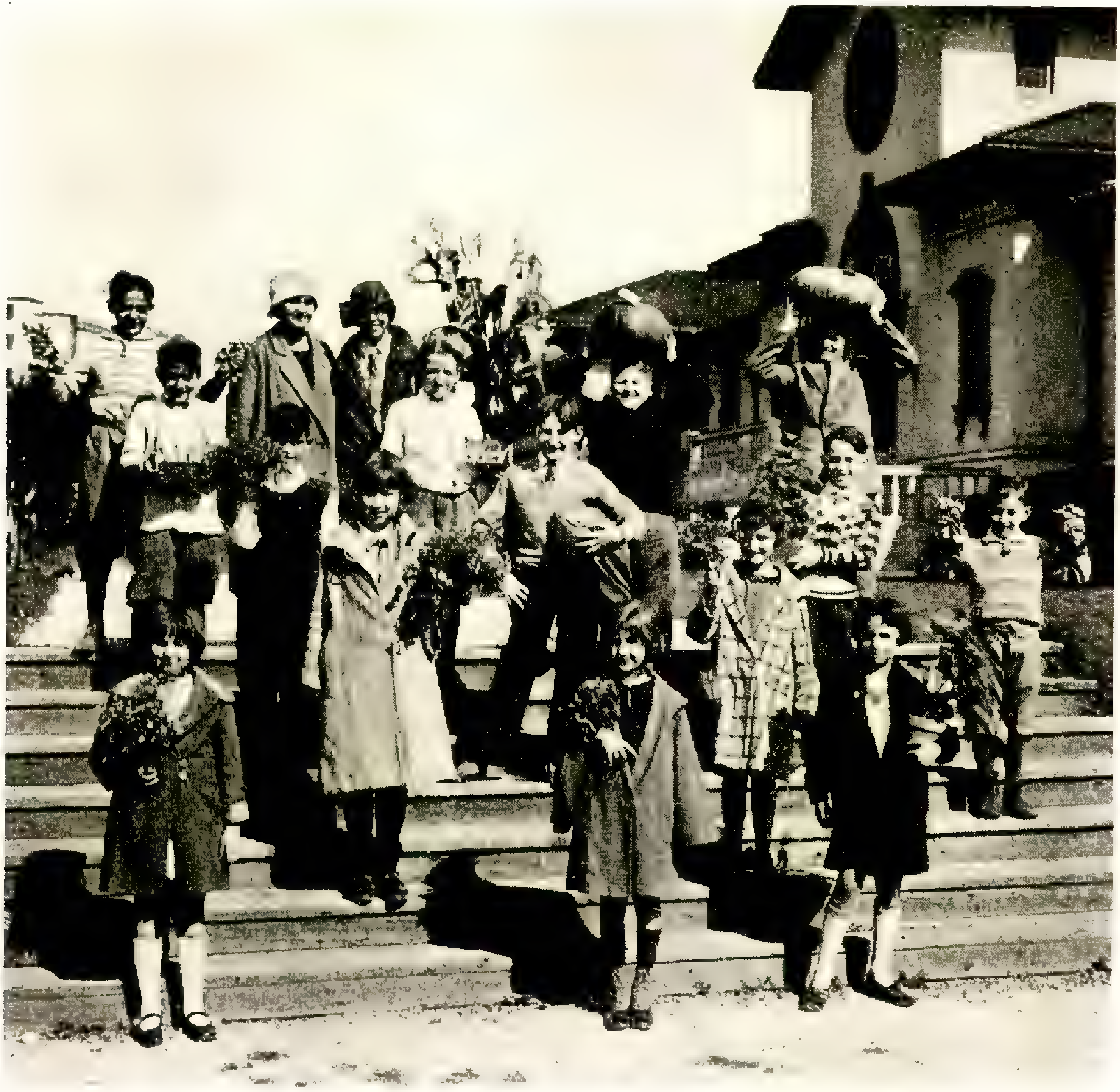


Fig. 18. Children's Horticultural Exhibit. Pupils of Public School 182 bring part of their exhibit. The flowers and vegetables were raised in their school garden from seed supplied by Brooklyn Botanic Garden. Sept. 25, 1925. (5616.)

rendering a valuable public service and wish to have a part in it, and to encourage and support it.

## III. Service to the General Public

The service which the Brooklyn Botanic Botanic Garden renders to the general public within the City is extensive and varied. This should be so, for though the annual appropriation which the City makes in its Tax Budget for the support of the Garden is not burdensome to the tax payer (amounting to only a fraction of one cent per inhabitant, and at present amounting, in the total, to less than one half the annual cost of maintenance), still the public is entitled to full and generous returns on its investment in the Botanic Garden.

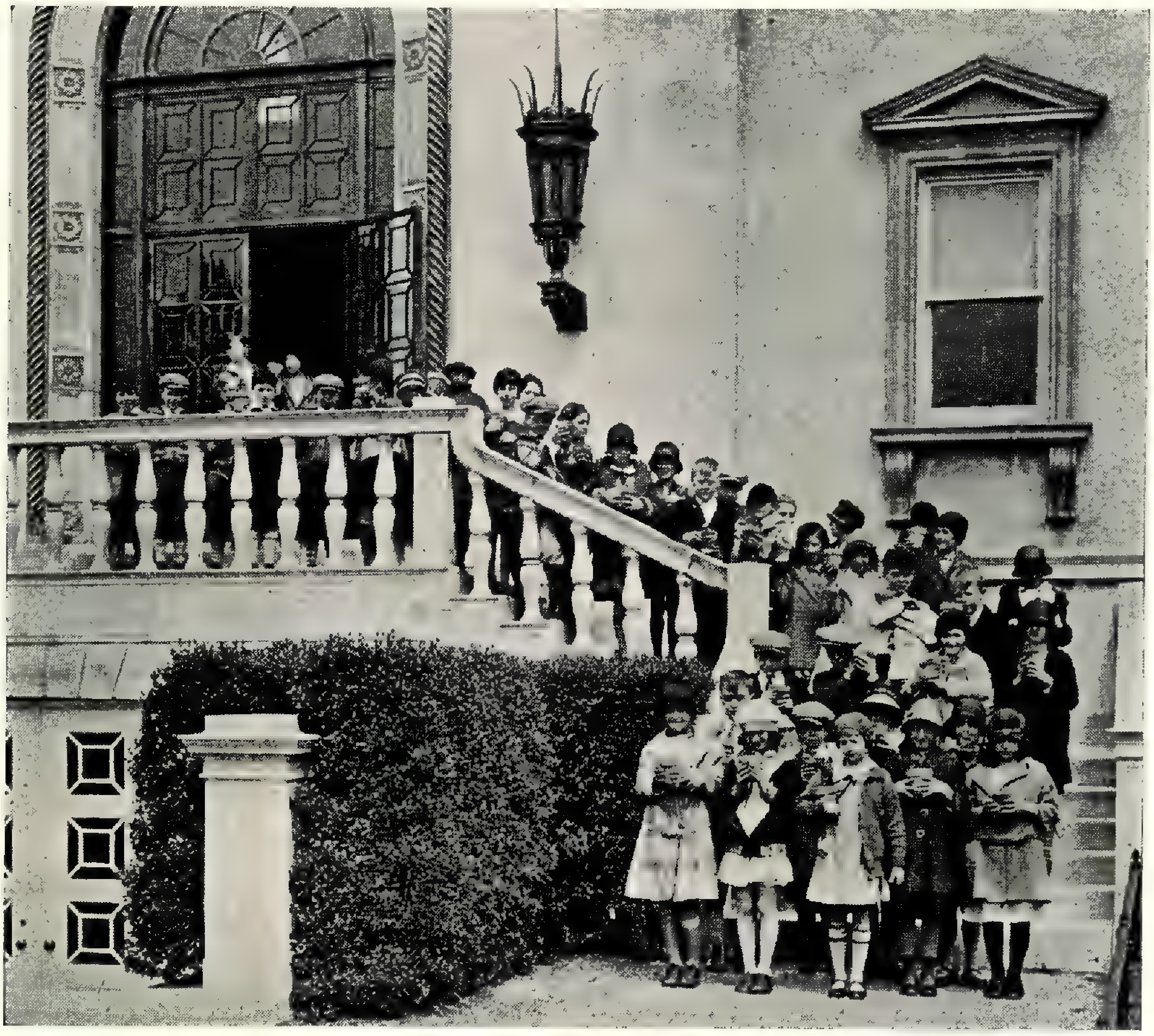


Fig. 19. Class from Public School 41 taking their share of the 25,000 potted plants placed in the classrooms of Brooklyn Schools by the Botanic Garden during 1927. (6197.)

## Plantations

Perhaps the largest service which the Garden has rendered to the City as a whole is the conversion of a tract of 50 acres, largely unused land and part of it an unsightly dumping ground when taken over in 1914 by the Garden, into what the daily papers have referred to as the most beautiful spot in Greater New York. In addition to being a thing of beauty, the plantations of the Garden perform an important educational function as an outdoor museum of living plants. It is now a daily occurrence to see visitors copying labels, making sketches and paintings of plants, flowers, and other features, and making other educational use of the grounds. Visitors frequently come into the Laboratory Building for information about the exhibits, or to look up questions in the Library or Herbarium, or, at times, to express their appreciation

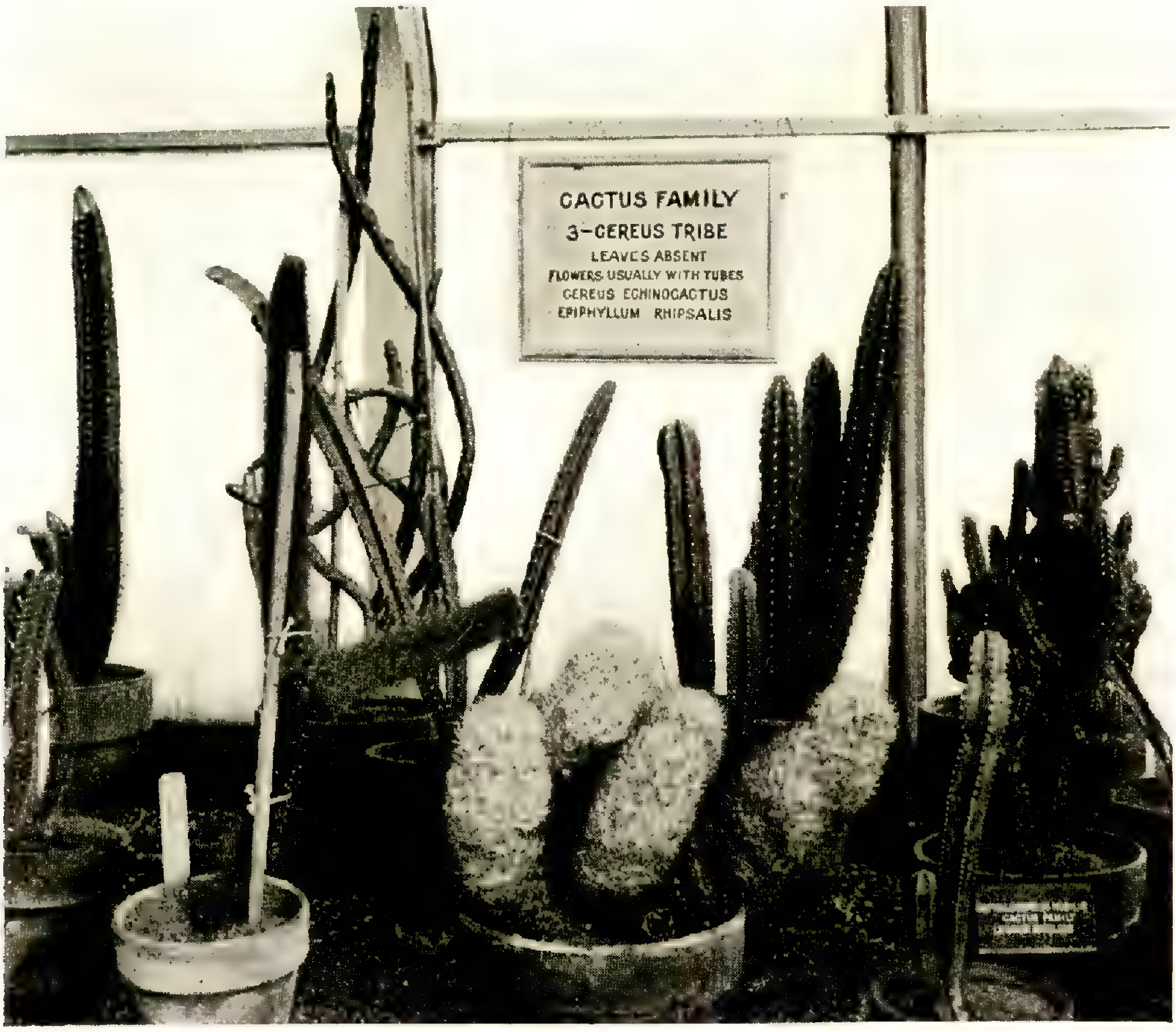


Fig. 20. Label on ground glass in the Conservatory. (6622.)

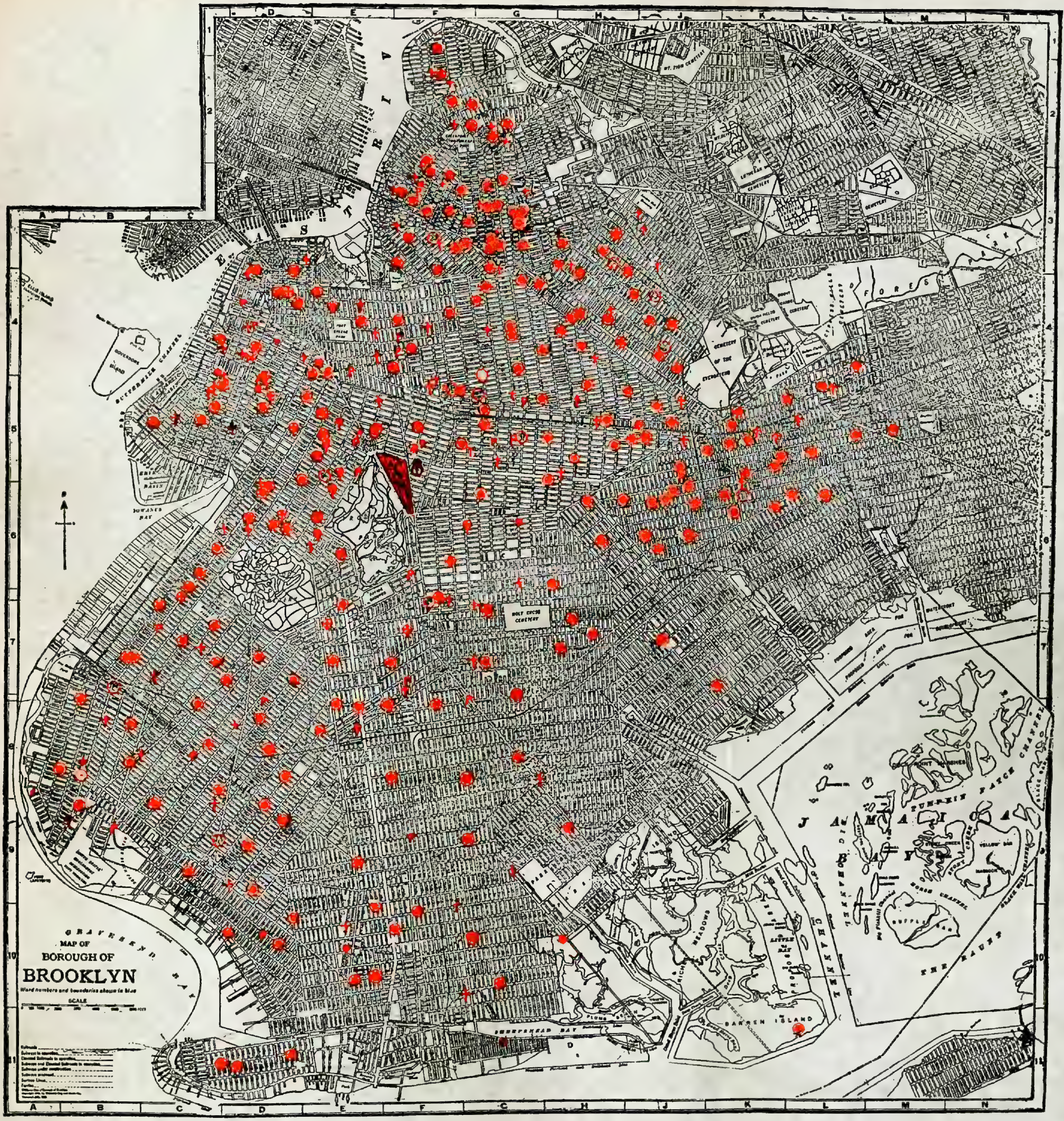


FIG. 21. Map of Brooklyn, showing the location of schools that are being served in one way or another by Brooklyn Botanic Garden. Open circles designate High Schools, all of which are being served; solid dots in circles designate Elementary schools (the so-called "Public Schools"), most of which are being served; a horizontal line through a dot in circle designates a Junior High School; a cross, Parochial school; a cross in a circle, Parochial High School; P, Private school (not parochial); T, Training School. A solid dot, elementary school not being served by the Botanic Garden. There are only 8 of these in Brooklyn.

of the Garden and inquire how they should proceed in order to become members.

For fuller information consult the General Guide, *Gardens within a Garden,* published in May, 1929. This guide contains a folded map of the Plantations. Guides to the various sections are also in preparation.

## Conservatories

The Conservatories, as in the case of most botanic gardens, do not contain horticultural or floral displays, such as one may find in the conservatories of a public park, but are devoted to *species* (as distinguished from horticultural varieties) of plants from other climates and not hardy in Brooklyn. Special emphasis is placed on plants of commercial or economic value. Particular attention has been given to labeling and the use of " story labels " in the Conservatories.

## Public Lectures

Public lectures are given from time to time on plant life and gardening, but the educational value of such lectures has not been found to be as great as results from courses of instruction. In Greater New York one may attend a lecture (either free or for only a nominal charge) almost every day of the year and at almost every hour of the day and evening. In addition to the lectures that one must go out to, in some hall, there are the radio talks that may be heard at home, on every conceivable subject, beginning with the " daily dozen " when one rises in the morning and continuing through the day (at meals and between meals) until the " bedtime story " at night.

In view of this, the Brooklyn Botanic Garden, while not definitely abandoning public lectures, does not consider them a major feature of its educational program. It is particularly interesting to note that, while attendance at free botanical lectures has been only moderate and fluctuating in numbers, and composed of a noticeable percentage of " repeaters " and persons in the leisure of advancing years, the attendance at courses of instruction (including laboratory and field work), extending over several weeks, and for which a tuition fee is charged, has been increasingly large and composed of new students, in the prime of intellectual vigor and

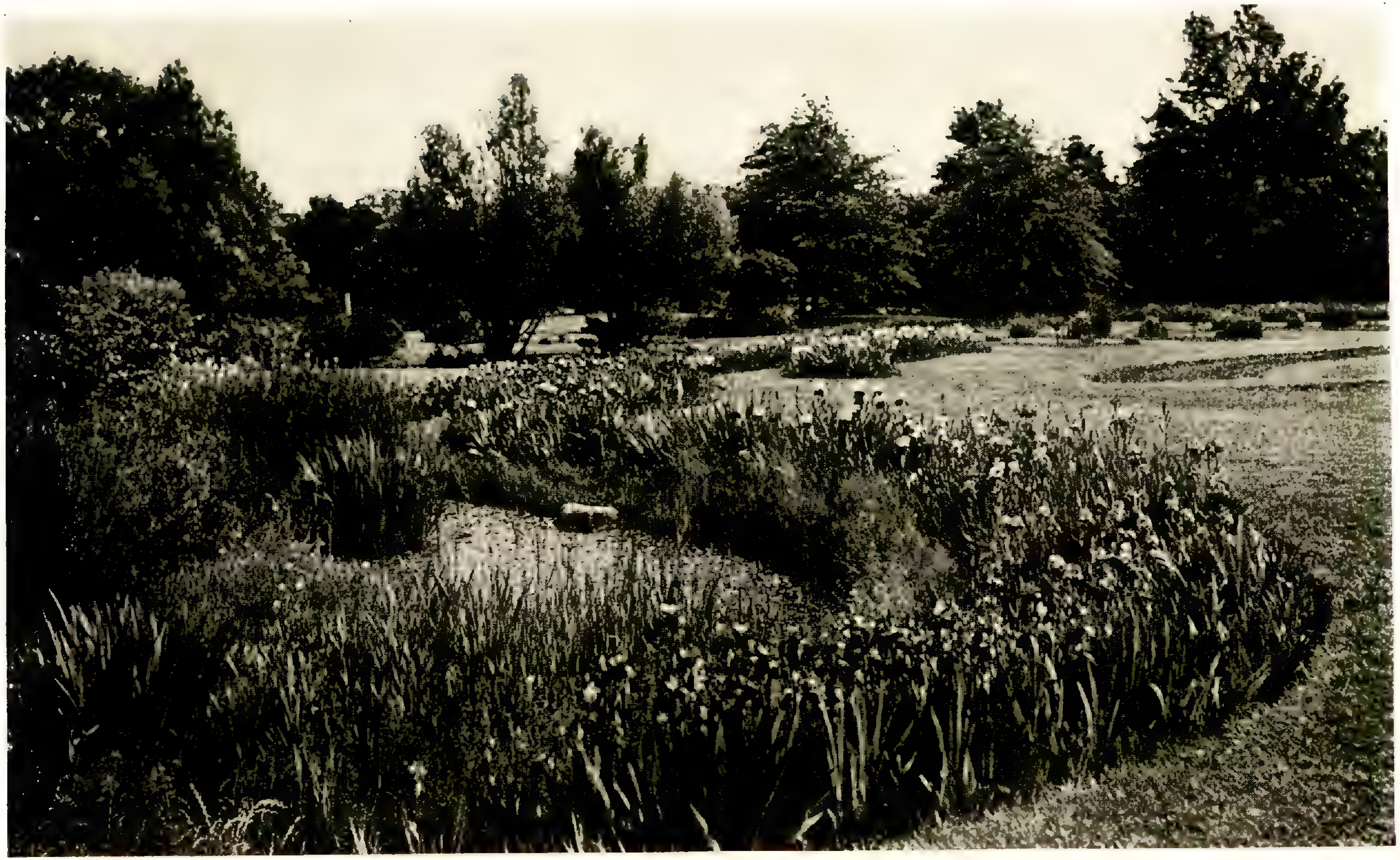


Fig. 22. Bearded Iris along the Brook. June 5. Illustrating the planting of horticultural varieties and the use of a plant in landscaping, in connection with its exhibit in the Systematic Section of the plantations. (4954.)

activity—with corresponding stimulus to the instructor, and correspondingly gratifying results from the educational standpoint.

### Courses of Instruction

Children, as well as adults, respond to opportunities for courses of instruction (even when tuition is charged) with more enthusiasm than they do to free lectures. Figures of attendance at courses at the Botanic Garden are fairly impressive. During 1928 the attendance at lectures and courses combined, in the form of classes from the City schools, was 54,749, while attendance of adults and children at our own courses, organized without reference to the schools, was nearly 50,000—a total attendance of 100,000—the larger part of which was at courses of instruction, where the attendance at each session of the class was rarely more than 50. The total number of *registrations* in courses during 1928 was 6257.

*Educational Value of Tuition Fees.*—Attention is also here called to the fact that a small charge to children for tuition makes the difference between failure and success. When this work was started no tuition was charged; the attendance was irregular and uncertain; the work was not succeeding. After it was decided to make a nominal charge the attendance became full, regular, and prompt. The fees are so small as to have value chiefly for their educational effect on the children. For example, for Course A1, Fall Greenhouse work, Saturdays, October 27 to Dec. 27, nine sessions, the tuition fee is fifteen cents.

A *Prospectus* of courses of instruction and other educational advantages offered by the Garden may be had for the asking; also copies of *Brooklyn Botanic Garden Leaflets,* Series XVI, Nos. 5–7 (June 2, 1928), which gives a survey of the work of the Department of Elementary Instruction from its organization in 1913 to 1928.

### Children's Gardens

Children's Gardens were started at the Brooklyn Botanic Garden in 1914 on part of the site of the present Laboratory Building. The " South Addition ", turned over to the Botanic Garden by the City, in 1914, it was laid out in 1915 with provision for the Children's Garden along the south east border—a plot

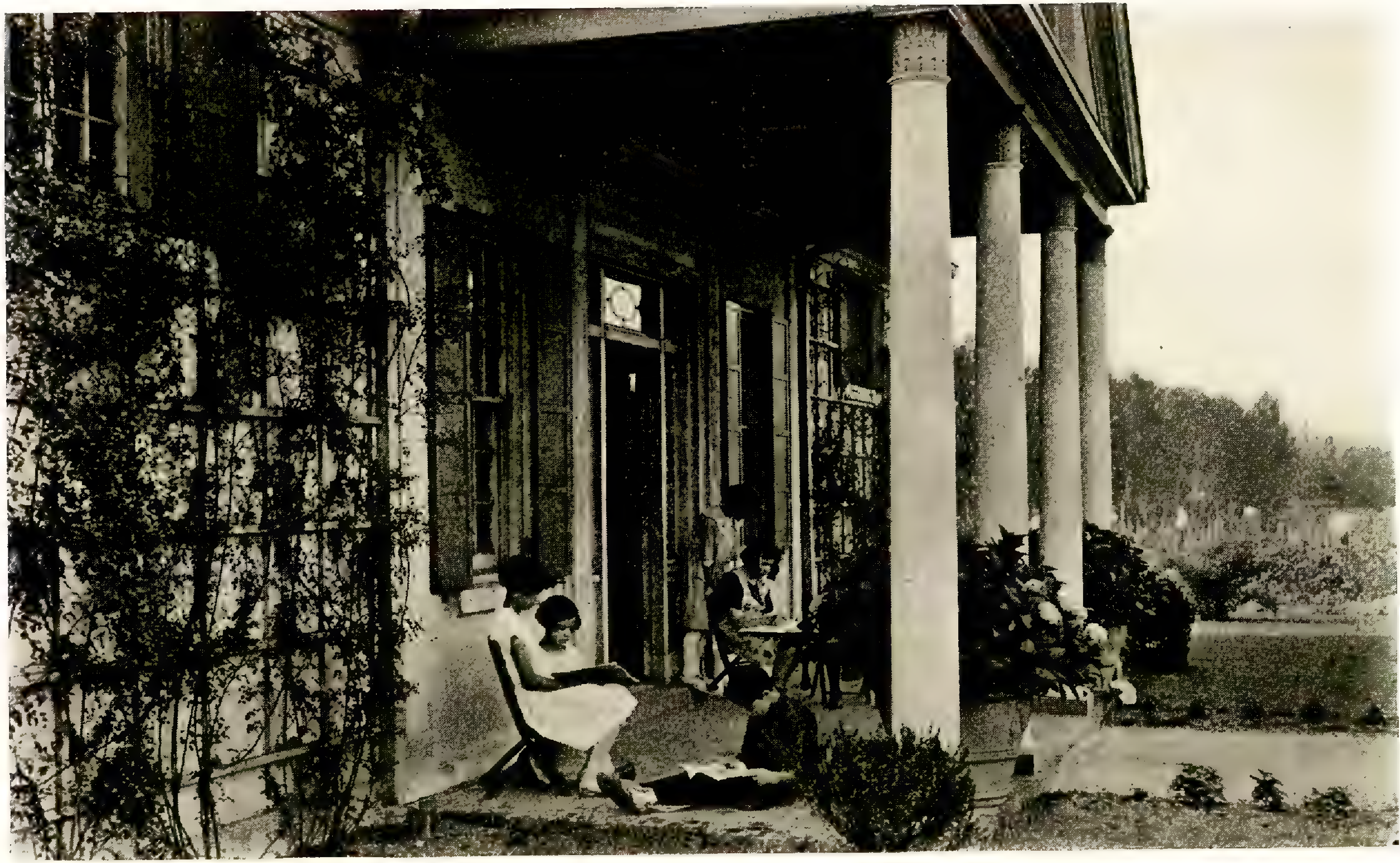


Fig. 23. Children's Building, with Children's Gardens beyond. July 23, 1923. (4584.)

of about one acre. Near the north end of this plot, the Children's Building was constructed with a conference room, and a tool storage room. The ground surrounding the building was laid out and planted with trees, shrubs, and herbaceous border, as a demonstration of horticultural materials for children and teachers' training classes. The remainder of the plot of about three quarters of an acre was divided into small garden plots for children. In 1925 a small *Shakespeare Garden* for children was laid out at the south end of the plot, the funds being provided by Mr. Henry C. Folger, of Brooklyn.

### *Not a Neighborhood Garden*

Membership in the Children's Garden includes boys and girls from all over Brooklyn. It has never been allowed to become a neighborhood affair. All of the children pay twenty-five cents for plots 8′ x 10′, and fifty cents for plots 10′ x 12′, and the seed supplied for planting.

### *The Children's Garden an Educational Discipline*

The Children's Garden is conducted strictly as an educational discipline. The children are required to take certain courses in the classroom and children's greenhouse before they may have a garden. However much the children (or their parents) may be interested in the crop, the interest of the Botanic Garden is in the boys and girls and the educational advantages they may derive from gardening. Our theory is that, if the garden is properly conducted from the educational point of view, the crop will be satisfactory. As evidence of this it may be pointed out that in one season, from three quarters of an acre, over $3,000 worth of vegetables are harvested, their value being based upon the prices charged by the green grocer on the days of harvest. Crops are harvested as they mature, and not at the end of the season. In 1928 the following total crop was recorded, in addition to a generous amount of flowers from the herbaceous border and the "picking" garden:

| | | | |
|---|---|---|---|
| Beans | 342 lbs. | Kohl Rabi | 2,408 |
| Beets | 3,795 | Lettuce | 3,999 heads |
| Beet tops | 135 lbs. | Parsley | 350 bunches |
| Carrots | 1,522 | Radishes | 19,201 |
| Chard | 878 lbs. | Spinach | 45 lbs. |
| Corn | 240 ears | Tomatoes | 25 lbs. |

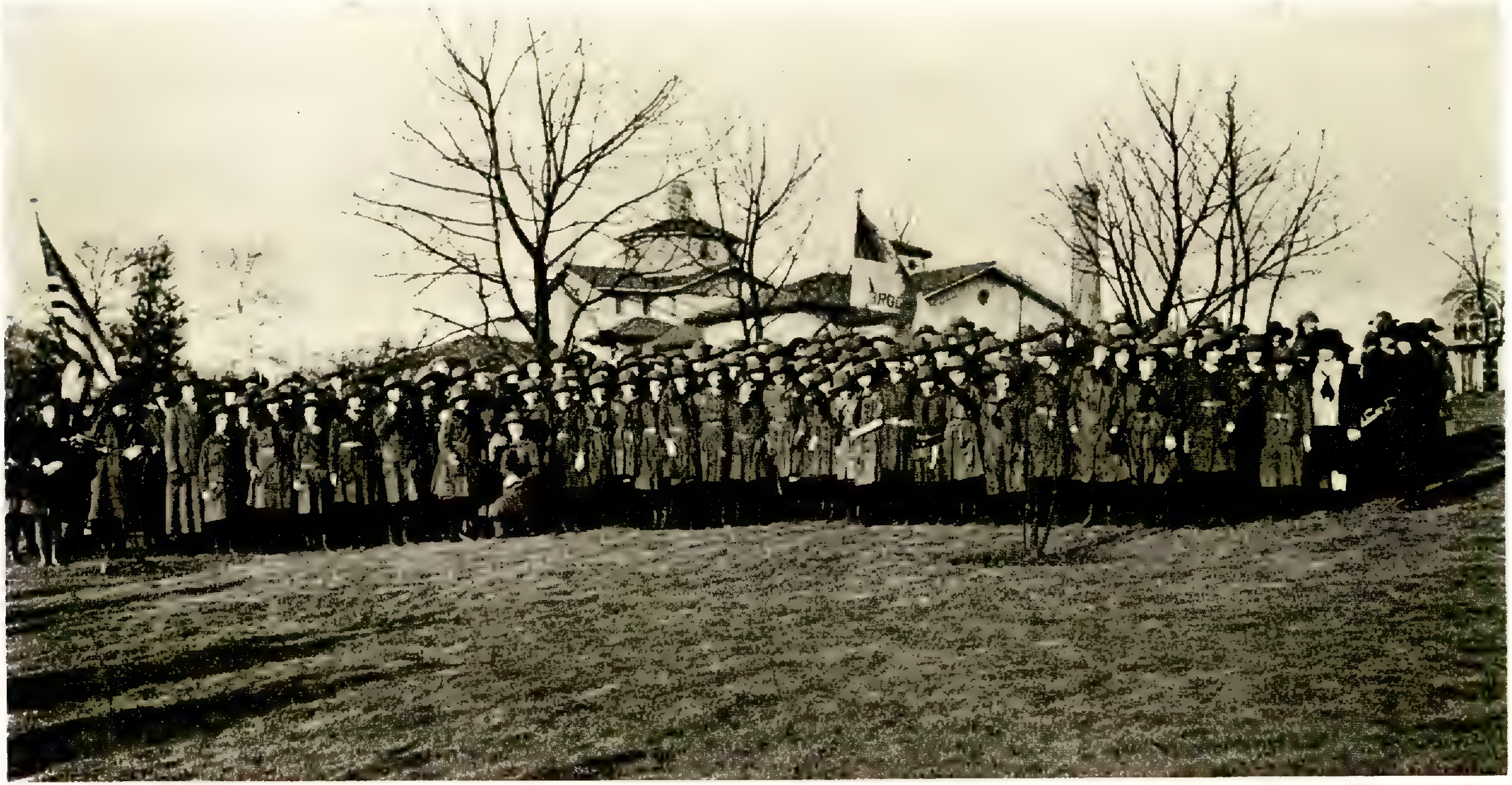


Fig. 24. Group of Girl Scouts at Brooklyn Botanic Garden for tree study in winter. February 17, 1921. (3669.)

### *Sustained Attendance*

Special attention is called to the continuity of attendance at children's courses. Many of our boys and girls have been registered every year for three or four years, several for as many as six and seven years, at least one for eleven years, and one for thirteen years, coming Saturdays and on vacation days for instruction in plant life and gardening. Some of these boys and girls have gone to an agricultural college or have specialized in botany in the university. For such the Garden awards annually a $100 scholarship provided for in perpetuity by the late Alfred T. White. Others have gone into the nursery or florist's business, and have become successful business men and substantial contributors to the endowment and collections funds of the Garden.

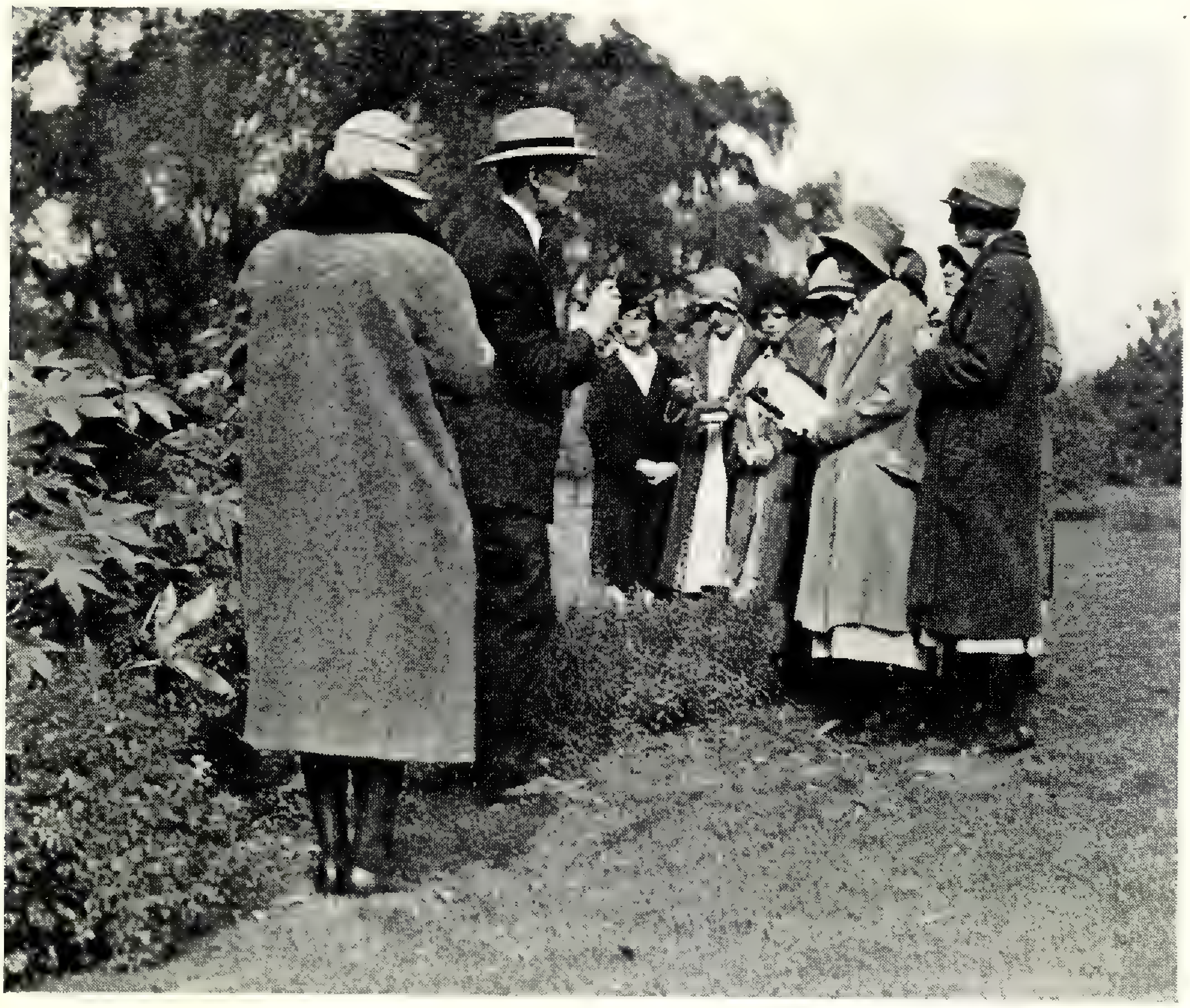


FIG. 25. Training class of nurses from Prospect Heights Hospital, having a field lesson on the Castor-oil plant (shown at the left). October 5, 1927. (6416.)

## Boys' and Girls' Club

A Boys' and Girls' Club was organized several years ago, composed only of those who have taken courses at the Garden. This Club has at present (1928) about 800 members, approximately one half boys and one half girls. A very attractive Children's Room has been fitted up in the Laboratory Building. This room was made possible by a gift of private funds, and here the boys and girls gather on Saturday mornings and at other times. Regular meetings are held with programs on botanical and gardening topics, and presided over by the officers of the Club. There are in this room a children's library of books on plant life, aquaria, terraria, and desert gardens all made and maintained by the children, nature study magazines, stereoscopic views of plants, flower panels, etc. At the windows hang transparencies of plant life. The Club publishes a monthly magazine, *Agricola,* now (1929)

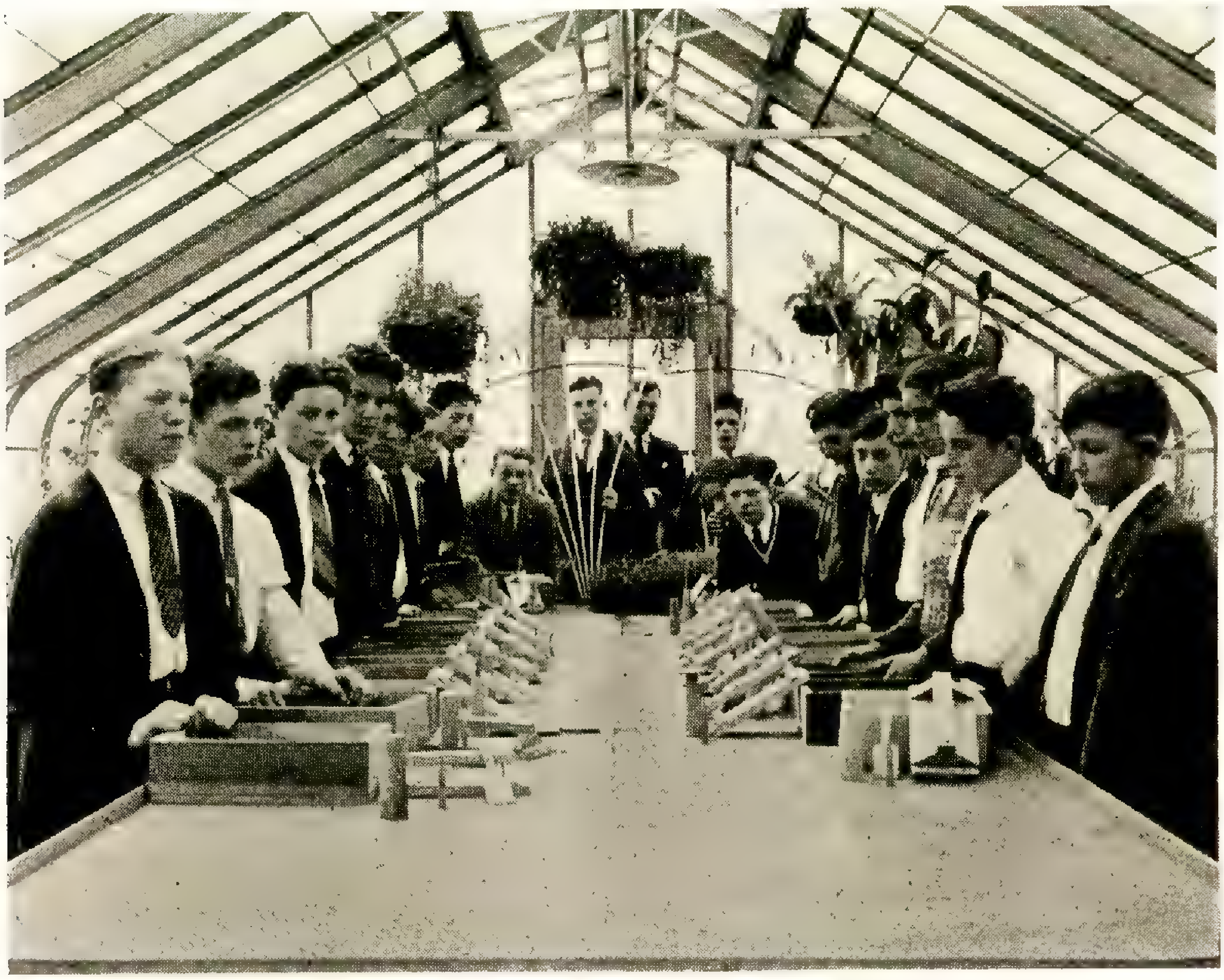


FIG. 26. Children's Greenhouse, Group of 20 boys with wooden implements for plant propagation work, made by the boys and presented by them to the Botanic Garden. Ready for a lesson. June 2, 1925. (5452.)

in its seventh year. All the activities of this club are supervised by a Staff advisor.

## Docentry

Docentry is a name first applied, about ten or fifteen years ago, by museums, to the plan of having a *teaching guide* to assist visitors in obtaining the most from their visits to the museum with the least expenditure of time and effort. The docent is not merely a guide who knows where exhibits are and how to reach them most directly, but is, in addition to this, competent to give instruction concerning the exhibits. All members of the Botanic Garden staff may act as docents from time to time, but this work regularly devolves upon the members of the educational departments. Docentry service is free to members of the Garden; to non-members a nominal charge is made, as indicated on the third page of the cover of this pamphlet. By one plan a docent makes regular trips scheduled in advance; the most satisfactory plan, so far, at the Botanic Garden, is to have parties (of not less than six adults) make special arrangements in advance for the service of a docent.

## Bureau of Information

The Bureau of Information includes practically every member of staff, for questions asked are referred to the one considered most competent to reply. Innumerable residents of Brooklyn and other Boroughs, both members and non-members of the Garden, inquire during the year concerning the care of house plants, lawns, trees and shrubs, places for purchasing seeds, plants, and garden supplies, fertilizers and all manner of garden operations, plant diseases, formulae for insecticides, native wild flowers, lectures on plant life, and a myriad of questions concerning plants, their uses and their products. Local authors are supplied with information and often with photographs for illustrations of books they are writing. Artists inquire concerning the use of plants and plant forms in design. Gas companies, florists, and neighborhood associations have been given information as to the effect of illuminating gas on trees and greenhouse plants.

A thorough investigation and report has been made for a local smelter company as to the effects of smelter fumes on vegetation.

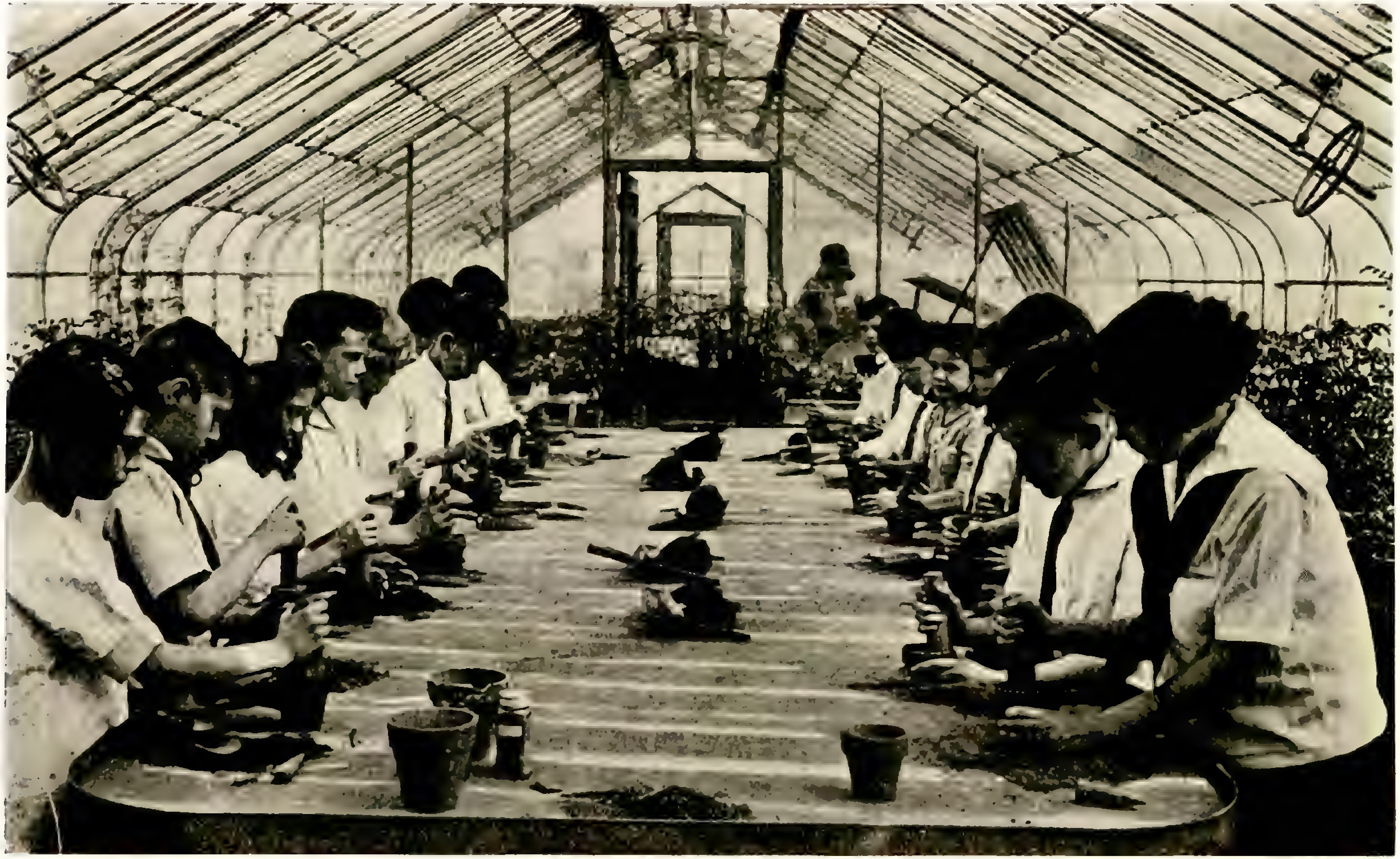


Fig. 27. Class of boys and girls in plant culture in the Children's greenhouse. One of three similar houses in the range. June 17, 1923. (4552.)

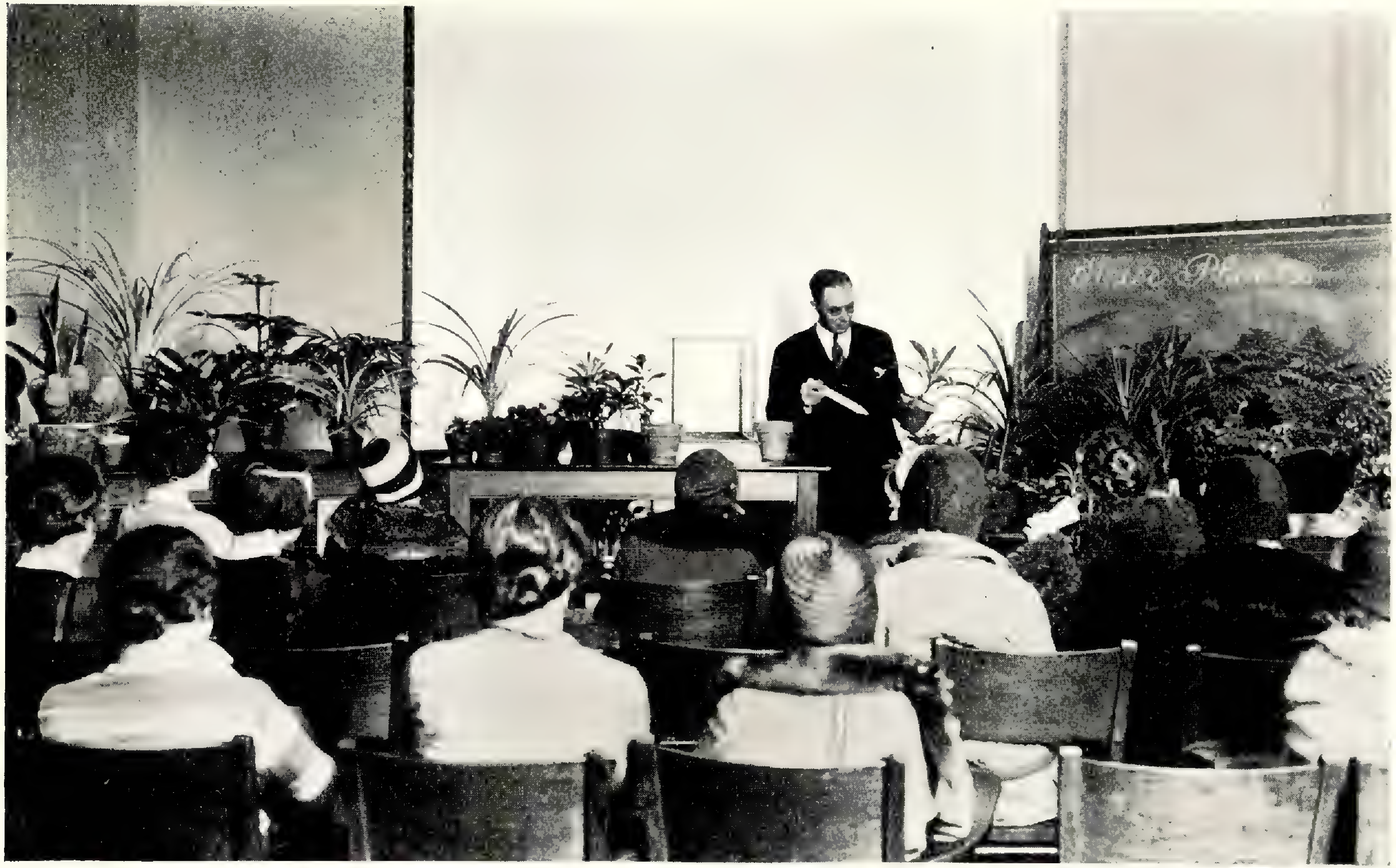


FIG. 28. Class of adults in "House Plants," showing rich illustrative material. November 8, 1928. (6630.)

Colored posters calling attention to the Garden have been framed and placed in all the branch libraries of the city and in schools. The design of these posters was obtained by a competition among art students of Brooklyn, with a prize for the design considered best and finally adopted.

Publicity concerning the Botanic Garden's activities, flowers in bloom, the best time to see certain exhibits, new and interesting accessions and developments, *et cetera,* is carried on systematically by weekly *Press Releases* from the curator of public instruction and the special publicity agent; by announcements posted on bulletin boards or mailed; by *Post-card Bulletins* to members, and by broadcasting talks on the Botanic Garden and on botanical and gardening subjects.

## Inspection of Yards and Gardens

Requests for inspection of yards and gardens are now being met to the limit of our capacity, with both oral and written reports on the treatment needed to obviate existing troubles.

## The Library

The Library, open free daily (except Sunday) to the public, has about 14,000 books, 10,000 pamphlets, and current issues on file of over 900 magazines and other periodical publications devoted to plant life and gardening. Bibliographical assistance is rendered to readers daily by the Library staff.

## The Herbarium

The Herbarium of flowering and non-flowering plants, comprising over 170,000 specimens, is also accessible for consultation daily.

## Cooperation with City Departments

Cooperation with City Departments is a constant feature of our local public service. A survey of the tree diseases of Prospect Park was made some time ago and the results published in the Brooklyn Botanic Garden RECORD.

The Department of Health has a program of public health education which includes instruction on local poisonous plants, and

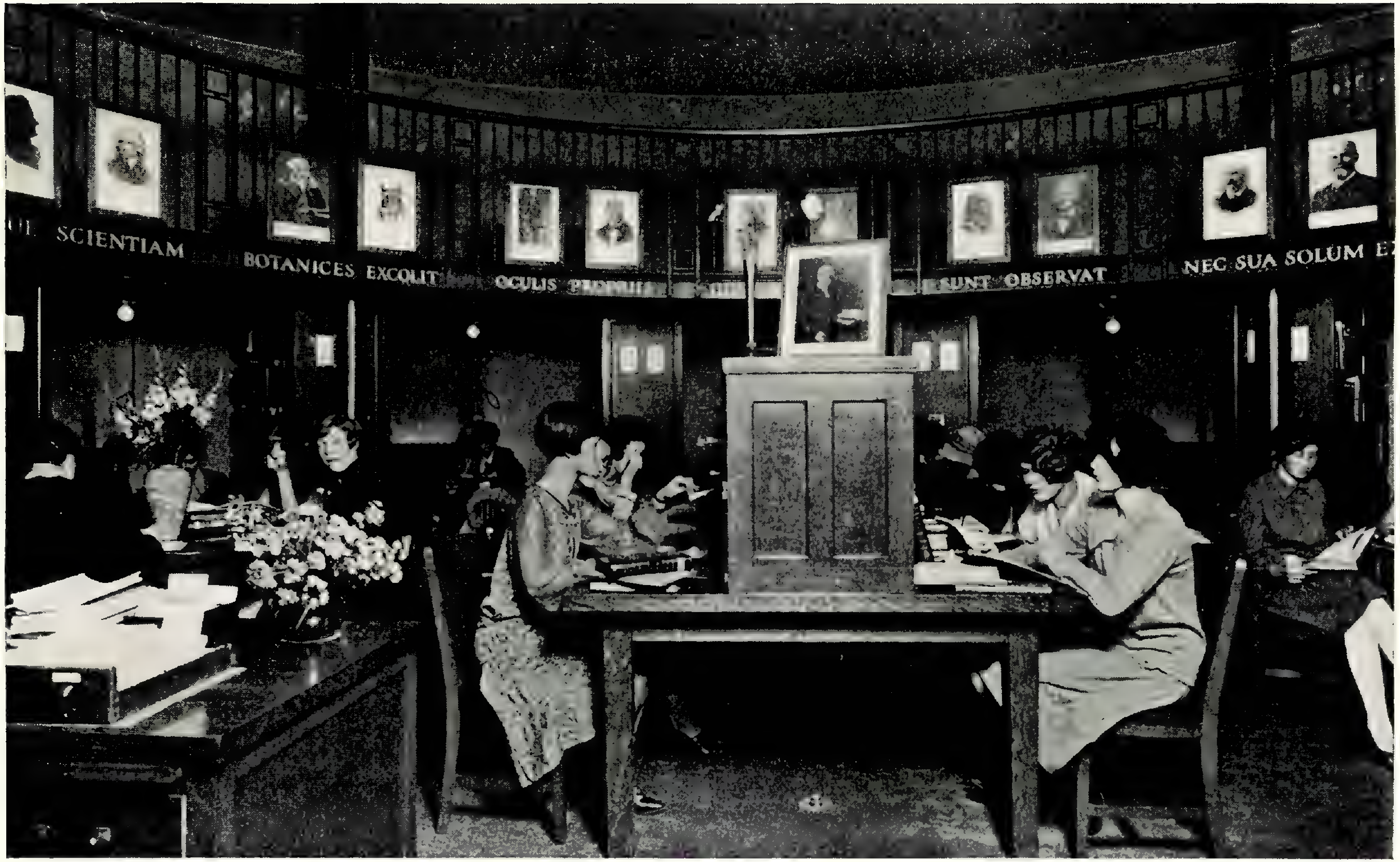


FIG. 29. The Library, showing students from the New York School of Fine and Applied Art, studying illustrations of plants for suggestions in design. (5844.)

on plants whose pollen is known to cause hay fever. The Botanic Garden has supplied the Health Department with pressed and mounted specimens of Poison Ivy (*Rhus Toxicodendron*) and the Five-fingered Ivy (*Ampelopsis*) commonly confused with it, and with specimens of the Ragweed (*Ambrosia*), one of the worst offenders in causing bronchial asthma (hay fever).

Our cooperation with the Department of Education, through the schools, has already been noted (pp. 200–218).

## Cooperation with Local Organizations

Cooperation with local organizations is constant and varied. Speakers are furnished for local garden clubs, mother's clubs, business men's and church organizations, the Chamber of Commerce, and others. The Garden is a member of the Civic Council of the Chamber of Commerce. A representative of the Garden has, for several years, been a member of the Committee on Plant Quarantines and their Administration, of the Merchants Association (of Manhattan).

Local organizations of all kinds have held meetings at the Garden and have been assisted in programs by speakers or otherwise. Among these organizations may be mentioned many Garden Clubs, the Torrey Botanical Club, New York Horticultural Society, New York Association of Biology Teachers, Department of Botany of the Brooklyn Institute of Arts and Sciences, Girl Scouts, Campfire Girls, Boy Scouts, and others.

## Public Exhibits

Public Exhibits are installed several times a year, including those at the annual Flower Show of the New York Horticultural Society in the Grand Central Palace; the Exposition of Women's Arts and Industries held in September at the Hotel Astor; the Annual Spring Inspection; the Boy Scouts Exhibits at the Garden; the United Parents Associations Educational Exhibit at Grand Central Palace; and others.

## Conservation Activities

The Botanic Garden, from its foundation, has been active in promoting an interest in the conservation of native American wild

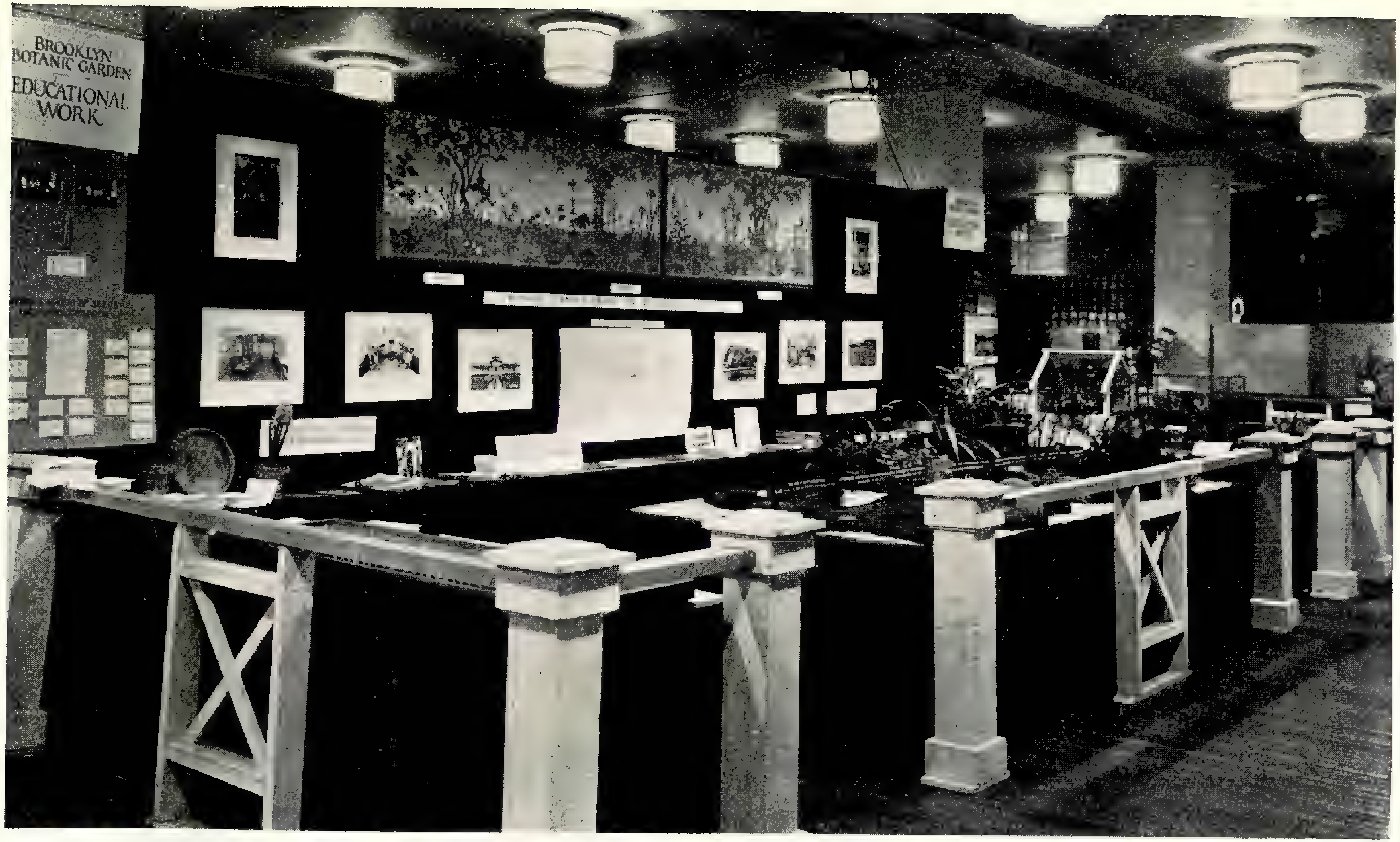


FIG. 30. Exhibit of Brooklyn Botanic Garden at the Fifteenth International Flower Show, Grand Central Palace, Manhattan, March 19–24, 1928. (Photo by Peter A. Juley & Son.)

flowers and ferns, both alone and in cooperation with other agencies. This work has included the following activities:

### *Publication of Conservation Literature*

Brooklyn Botanic Garden *Leaflets,* Series XII, No. 2 (April 16, 1924) entitled *The Conservation of Beauty,* was soon exhausted and was revised and reprinted as *Leaflets,* Series XIII, No. 5–6 (June 10, 1925), in cooperation with the Torrey Botanical Club, the New York Bird and Tree Club, the American Fern Society, and the New York Association of Biology Teachers, all of whom contributed funds for the publication and distribution of an issue of 5,700 copies. There was a large demand for the *Leaflet* from all over the country, and one of the illustrations, showing quantities of Flowering Dogwood being loaded into an automobile, was reproduced by the monthly journal *Horticulture* (Boston), and by the Minnesota State Horticultural Society, St. Paul. (*Cf.* p. 239.)

Series XV, No. 11–12, of the *Leaflets* (November 30, 1927) was entitled "What Price Christmas Greens", and called attention to the great quantities of American Holly (*Ilex opaca*), Mountain Laurel (*Kalmia latifolia*), Ground Pine (*Lycopodium complanatum* and *L. obscurum*), Black Alder or Common Winterberry (*Ilex verticillata*), and Mistletoe (*Phoradendron flavescens*) now being collected for sale at Christmas time. The following suggestions were made toward a solution of the problem of conserving these plants:

1. Encouraging the growing and marketing of Christmas greens on a commercial scale (as a crop) by nurserymen, landowners, and others.
2. The protection of these plants by rigid state laws.
3. Public education, through schools and otherwise, of the need of conserving these plants, and of respect of private property rights in the matter of collecting such material in the open country at Christmas time.

Other *Leaflets* on conservation topics have been the following:

*How shall we save rare plant species from extinction?* (Series XVI, No. 4. May 16, 1928.)

*Practical suggestions for the growing of Christmas greens.* (Series XVI, No. 10–11. Dec. 5, 1928.)

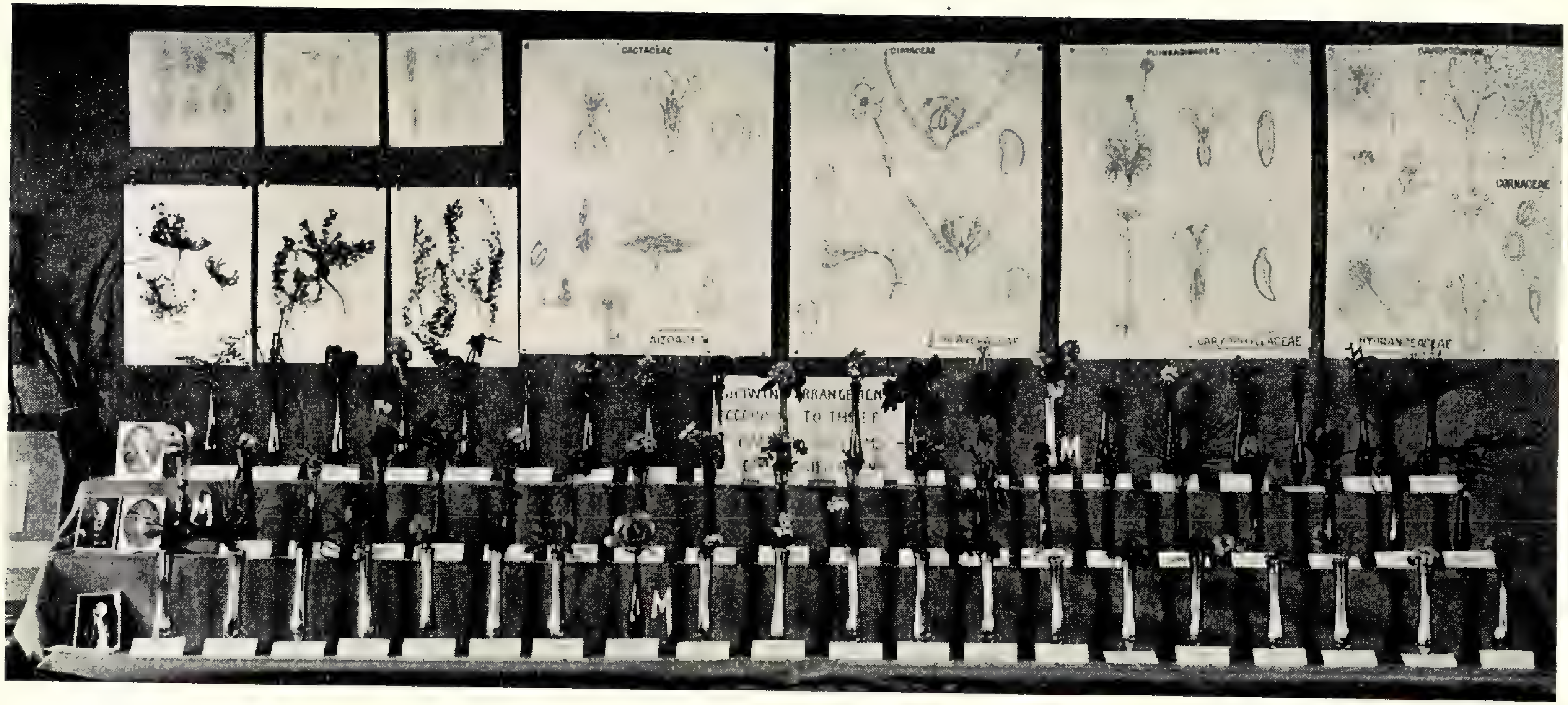


FIG. 31. Portion of exhibit at Spring Inspection, 1927, to illustrate the sequence of plant families according to Jussieu, 1789 (top row); Bentham and Hooker, 1862–83 (middle row); and Engler, 1889–1900 (bottom row). In each row the same twenty families are represented, each by a flowering or leafy branch from a plant belonging to that family. Note, for example, the different positions of the Magnolia (M). (6200.)

Attention has also been called to the conservation problem in the *Annual Reports* of the Botanic Garden since the Report for 1923. The preparation and distribution of special literature relating to the protection of native plants began in 1922. In 1923 nearly 3,000 copies of an article on *Game laws for ferns and wild flowers,* by Dr. R. C. Benedict, resident investigator, were distributed as reprints from the *American Fern Journal* (**12**: 33–45. Sept. 1922), together with numerous copies of other articles, in cooperation with the American Fern Society.

### *Conservation Meetings*

On May 23, 1923, there was held at the Garden a joint meeting of three organizations,—the Wild Flower Preservation Society, the American Fern Society, and the New York Bird and Tree Club, with representatives from other similar organizations from Chicago, Washington, and several eastern states. This meeting authorized the appointment of a committee, representing the organizations in attendance, to take action toward the amendment of the conservation laws of New York State so as to provide protection for native American plants. The Chairman of the Committee was Dr. Benedict, representing both the Botanic Garden and the American Fern Society.

At the second meeting, held at the Garden on May 28, 1924, this Committee presented its report, recommending that the State Legislature be urged to insert the word " plants " in the Private Parks Section of the State Conservation Law. The report was approved and the committee re-elected for 1925, with new members added. (*Brooklyn Bot. Gard. Rec.* **13**: 127–128. July, 1924.)

At a meeting held at the Garden on May 26, 1926, the Federated Garden Clubs of New York State joined the group of cooperating societies. It was reported that, as a result of the work of the committee of these organizations, the Conservation Law of New York State had been further amended so as to make it unlawful wilfully to destroy Trailing Arbutus (*Epigaea repens*), Flowering Dogwood (*Cornus florida*), Mountain Laurel (*Kalmia latifolia*), or Pink Lady's Slipper (*Cypripedium acaule*), " growing on the lands of the people of the State, or in any street, highway, public place or park belonging to, or under the control of any county, city, town or village." Any person doing this "shall be guilty of a misdemeanor." This act received the signature of Governor Alfred E. Smith, April 13, 1926, and took effect immediately.

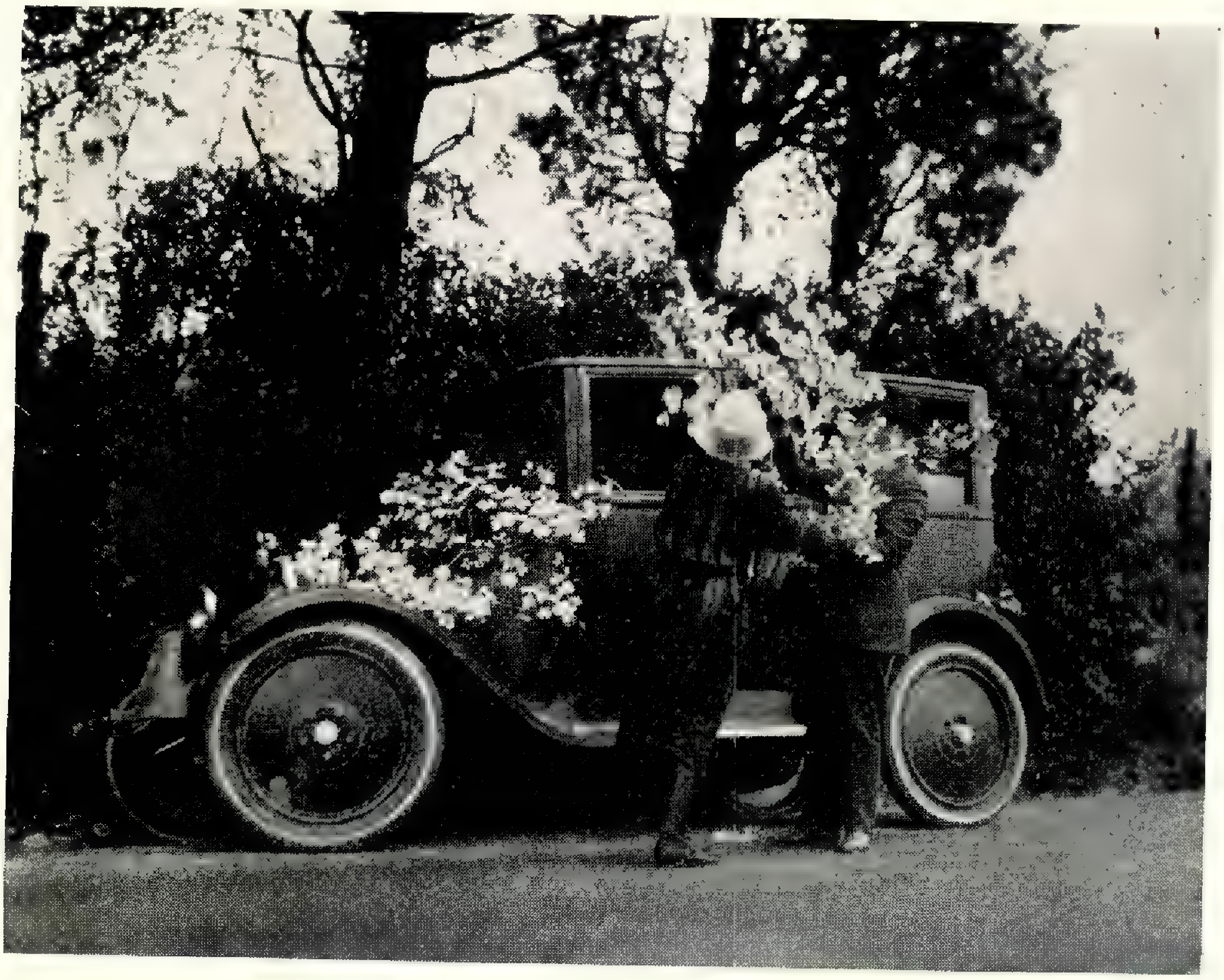


FIG. 32. Flowering Dogwood being loaded into an automobile after having been broken from wild trees. Reproduced from Brooklyn Botanic Garden *Leaflet* entitled, "The Conservation of Beauty."

### *Lectures and Broadcasting on Wild Flower Conservation*

This work began on April 8, 1922, when the Director of the Garden spoke on "The Contributions of the Brooklyn Botanic Garden to the Conservation Movement," at the final program of "Conservation Week," held under the auspices of the New York City Federation of Women's Clubs, Borough Hall, Brooklyn. Addresses and broadcastings have since been given on the general subject of conservation by different members of the Garden staff.

### *Propagation and Distribution of Native American Plants*

In the Botanic Garden *Leaflet* for April 16, 1924 (mentioned above), attention was called to the desirability of propagating some of the rare species of native American wild plants with the idea of distributing seeds and young plants to persons who would be able to grow them. As a step in this direction Dr. Benedict began in the fall of 1925 to raise, from spores, plants of the Hart's Tongue Fern (*Scolopendrium vulgare*), found in only two restricted areas in America (in Tennessee and New York), and in danger of becoming exterminated in one of these areas (Green Pond, near Syracuse, N. Y.) on account of quarry operations. About 1,000 young plants ("sporelings") were grown that year and distributed in 1926 and 1927. It is planned to continue this work.

### *Wild Flower Preserves or Sanctuaries*

In the *Leaflet* of April 16, 1924, the importance was urged of providing preserves or "sanctuaries" for Native American Flora, especially the species suffering from vandalism and consequently becoming rare and in danger of extinction in the vicinity of large cities. This was referred to again in the *Annual Report* of the Garden for 1925, and in *Brooklyn Botanic Garden Leaflets,* Series XVI, No. 4 (May 16, 1928), entitled "How shall we save rare plant species from extinction?" In the *Leaflet* it was pointed out that, "For practical conservation, private initiative must take the lead in setting aside tracts of land as sanctuaries where the propagation of rare plants and their naturalization can be carried out."

Conservation activities are a continuing interest of the Botanic Garden.

## WORLD SERVICE

### 1. Botanical Publications

Brooklyn Botanic Garden publications circulate in 65 foreign countries, besides the circulation in the United States. They fall naturally into three groups, as follows:

**a. Technical,** devoted exclusively to publishing the results of research done at the Garden or at other institutions. These include, *Brooklyn Botanic Garden Memoirs.*

*Brooklyn Botanic Garden Contributions.*

*American Journal of Botany* (Official publication of the Botanical Society of America).

*Ecology* (Official publication of the Ecological Society of America).

*Genetics* (In cooperation with the Editorial Board of Genetics).

*Delectus Seminum* (*Seed List*)

Further information concerning these may be found on the fourth page of the cover of this publication.

b. **Popular,** including

*Brooklyn Botanic Garden Leaflets.*

*Guides* to the Brooklyn Botanic Garden.

*Miscellaneous*

Flower Games (A booklet for children).
List of Books on Gardening and Botanical Nature Study.
Etc.

The *Guides* and *Seed List* are published as regular numbers of the *Brooklyn Botanic Garden Record,* and are sent regularly without charge, to members of the Garden. (For information concerning membership see page 195 and cover page 3.)

c. **Administrative,** including

*Brooklyn Botanic Garden Record,* a quarterly from 1912 to 1928, now a bi-monthly, comprising the *Annual Report,* and also the Seed List and Guides mentioned above. Free to Botanic Garden members. See also the fourth cover page.

### *Exchange of Publications*

In the paragraph on the Library (p. 232) attention is called to the fact that more than 900 periodical publications are currently received in the Garden Library. In this connection it may be pointed out that many of these are received in exchange for Brooklyn Botanic Garden journals. Our own publications, therefore, serve a double purpose, not only disseminating the results of American research, but bringing to our own city, and making freely accessible to the public, the published results of botanical research in other countries.

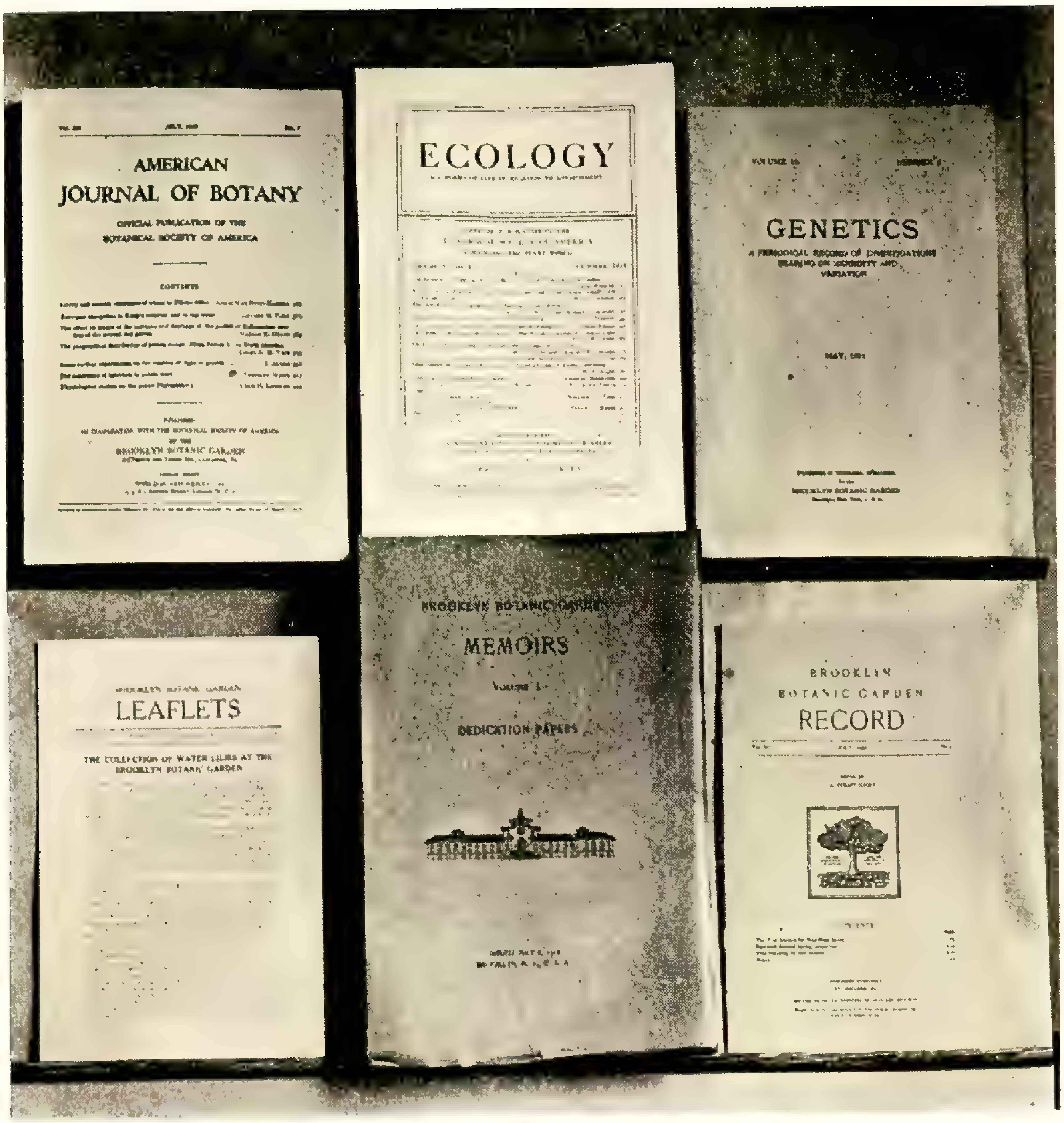

AMERICAN JOURNAL OF BOTANY
OFFICIAL PUBLICATION OF THE BOTANICAL SOCIETY OF AMERICA
BROOKLYN BOTANIC GARDEN
ECOLOGY
GENETICS
A PERIODICAL RECORD OF INVESTIGATIONS BEARING ON HEREDITY AND VARIATION
BROOKLYN BOTANIC GARDEN
LEAFLETS
THE COLLECTION OF WATER LILIES AT THE BROOKLYN BOTANIC GARDEN
BROOKLYN BOTANIC GARDEN
MEMOIRS
DEDICATION PAPERS
BROOKLYN BOTANIC GARDEN
RECORD

FIG. 33. Publications of Brooklyn Botanic Garden. (5673.)

## 2. EXCHANGE OF SEEDS WITH OTHER BOTANIC GARDENS

Seed exchange lists have been published for many years by foreign botanic gardens. The earlier issues of some gardens are of scientific value as they were the places of original publication of new scientific names or names of new species. Such more or less casual publication of names has for some time been abandoned, but the seed exchange lists serve a valuable purpose in acquainting botanic gardens with seeds available from various countries. By the mutual exchange of these seeds the collections of each garden may be constantly enriched. The Brooklyn Botanic Garden was apparently, the first Garden of the United States to publish regularly a seed exchange list, and was for several years the only garden doing so. Our endeavor is to make each list as rich as possible in seeds of native American plants, and these are the plants for which there are the most frequent demands from foreign gardens. At present, seeds of herbaceous and woody plants are offered in alternate years. In 1928 seeds of 284 woody species were listed; in 1929 seeds of 642 herbaceous species.

In 1928 the Garden received from other Gardens (European and Asiatic) seeds of over 1200 species; in 1929, nearly 1000 species.

### 3. BUREAU OF INFORMATION

**a. Inquiries** are daily received by letter, telephone, and personal conference, in ever increasing number, from all parts of the United States and from foreign countries, concerning every aspect of plant life, gardening, and botanic gardens. A large fruit company inquires about diseases of the banana; two institutions ask for a list of texts and other books to serve as the nucleus of new libraries; a representative of a State Public Service Commission inquires for a bibliography and information concerning market prices of the Ramie fiber plant; a representative of a large manufacturing company in Mexico is loaned copies of the *Journal of Agricultural Science* for the purpose of making photostat copies of certain articles; a public school official of an Ohio city inquires where plant labels may be obtained to use in marking the trees and shrubs on the school grounds and adjacent park; a correspondent in California requests the addresses of firms that supply recording instruments needed in a study of the physiology of the cotton plant; a textile firm in New York consults colored illustrations and living specimens of South and Central American plants for designs for upholstery and drapery fabrics; the principal of a college in Wales comes for information concerning our educational work with children; a land and lumber company of Illinois inquires as to the best varieties of daffodils for planting naturalistically in its lawns; a bulb grower of the State of Washington requests permission to use in his advertising photographs of "naturalized" bulb plantings at Brooklyn Botanic Garden; numerous artists are supplied with material to illustrate advertisements of commercial plant products; a Latin student obtains information concerning the

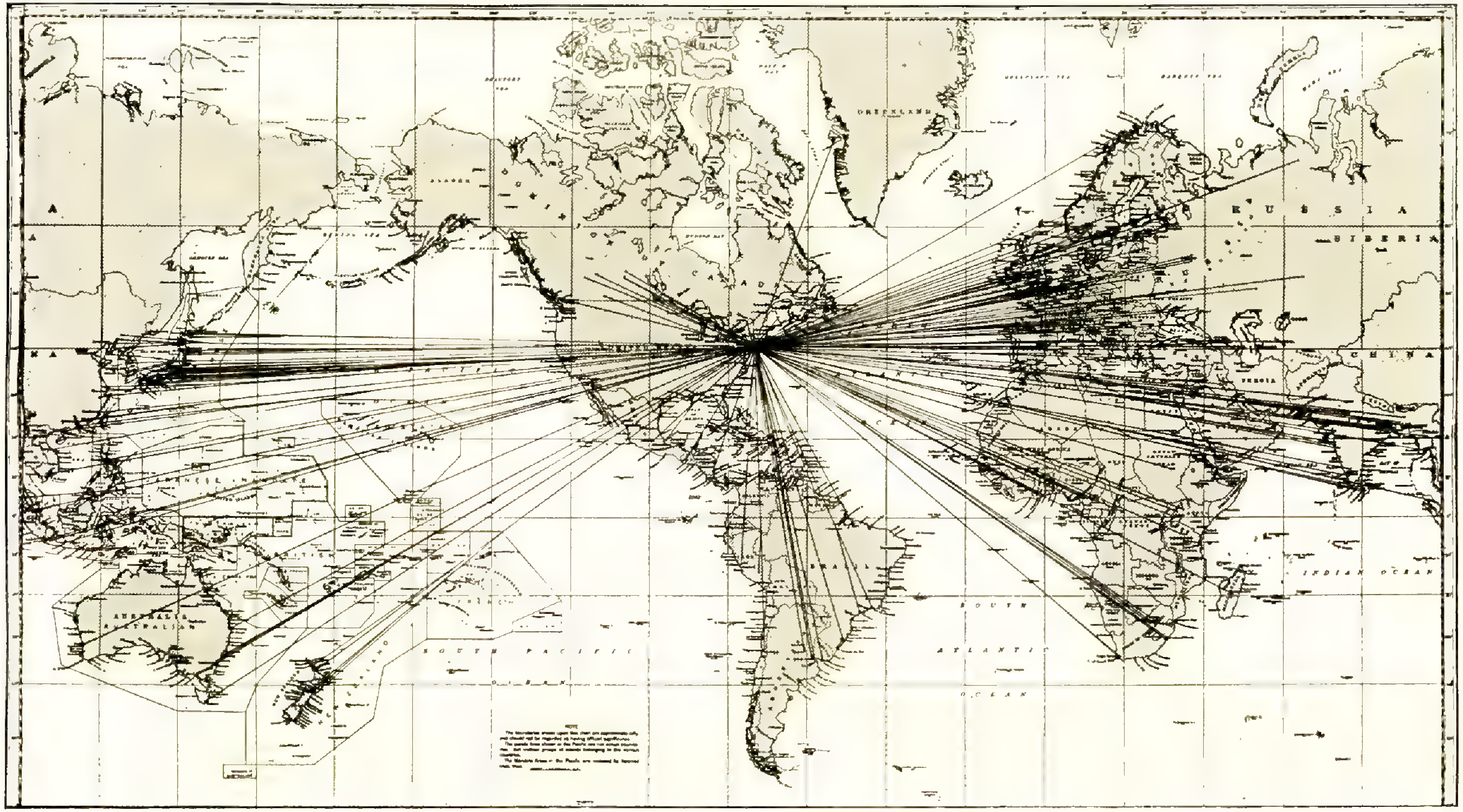


FIG. 34. Map showing world circulation of seven Brooklyn Botanic Garden publications, as of January 1, 1929. Most of the lines are significant in both directions, for publications are currently received in the Botanic Garden library from most of the foreign points to which the Garden publications go. The library is open free to the public daily.

phenology of plants mentioned in Virgil to use in connection with a thesis on "The time element in the Aeneid;" a wholesale florist from a city in Pennsylvania consults a member of the Garden Staff concerning the effect of illuminating gas on plants, and arranges for testimony in court which is an important factor in his winning a verdict of $40,000 for damages against a gas company; a correspondent in New Zealand asks concerning American text books on ecology; a corporation in California wishes information as to how the establishing of a botanic garden affects property values in the vicinity of the garden; another asks concerning Tung oil, and is referred to a complete bibliography on the subject (four bound volumes) in our library; an author is seeking for the first published illustration of Indian corn (*Zea Mays*) and finds it in one of the books in the pre-Linnean collection in the Library; a representative from the Department of Apparatus and Development of the Laboratories of a large Telephone Company came and secured information concerning a "chisel forceps", used for obtaining samples (for a culture) of the diseased part of timber without splitting the wood. Many specimens of plants are received by mail for determination. The list of cases could be continued almost indefinitely.

**b. Press releases to the Associated Press** are sent at regular intervals. During 1928 over 1,100 clippings were received of such articles, sent to the daily press concerning plant life and the activities of the Brooklyn Botanic Garden. These Associated Press articles have appeared in the newspapers of 30 states.

In addition to news items, articles on the Botanic Garden are appearing at frequent intervals in Magazines throughout the world.

**c. Advertising** of Brooklyn Botanic Garden publications was begun several years ago, and these advertisements appear at intervals during the year in the scientific and educational press of practically all the larger civilized countries.

### 4. COOPERATION WITH NATIONAL AND INTERNATIONAL ORGANIZATIONS

The extent of the Garden's cooperation with other institutions, domestic and foreign, is given in the chart facing page 199, and emphasises the extent of the World Service of the Brooklyn Botanic Garden. In the *Fifteenth Annual Report* of the Garden (for 1925) there was published a list of 85 foreign and 755 domestic institutions (a total of 840) with which the Garden had actively cooperated that year.

### INQUIRIES INVITED

The Garden will gladly answer any inquiries concerning the organization and conduct of its educational program. Such inquiries may be addressed to the Curator of Public Instruction, Brooklyn Botanic Garden, 1000 Washington Ave., Brooklyn, N. Y.

### STATISTICS AND FORMS

The following pages contain statistics of the Garden's educational work, and reproductions of lecture bulletins, used in our School Service, and of guide sheets, syllabi of lectures, and other forms used in the Department of Elementary Instruction.

### OTHER PUBLICATIONS GIVING INFORMATION CONCERNING BROOKLYN BOTANIC GARDEN

1. **Research at the Brooklyn Botanic Garden.** *Brooklyn Bot. Gard. Rec.,* **16**: 143–188. July, 1927.
2. **Facts about the Brooklyn Botanic Garden.** *Brooklyn Bot. Gard. Rec.,* **17**: 147–163. July, 1928.
3. **Gardens within a garden:** *A general guide to the grounds of the Brooklyn Botanic Garden: Guide No. 2.* With folded map. *Brooklyn Bot. Gard. Rec.,* **18**: 153–188. May, 1929.
4. **Prospectus of courses, lectures, and other educational advantages offered to members and to the general public.** *Brooklyn Bot. Gard. Rec.* September issue of each year.
5. **Annual Report.** *Brooklyn Bot. Gard. Rec.* March issue of each year.

## STATISTICS OF SCHOOL SERVICE

| | *1928* | *1927* |
|---|---|---|
| *Conferences* | | |
| Number of Teachers | 1,060 | 670 |
| Number of Pupils involved | 49,600 | 21,580 |
| *Loan Lectures* (Lantern slides, etc) | | |
| Number of Teachers | 69 | 26 |
| Number of Pupils attending | 6,736 | 2,174 |
| *Study Material Supplied* | | |
| Number of Schools and annexes | | |
| High | | |
| In Brooklyn (Total No. in Borough, 14, plus 17 Annexes) | 25 | 21 |
| In Queens | 8 | 6 |
| In Manhattan | 19 | 8 |
| In other Boroughs | 10 | 4 |
| Junior High Schools (Total No. in Brooklyn, 17) | 18 | 12 |
| Colleges, Universities, and Museums | 11 | 8 |
| Training Schools for Teachers | 4 | 2 |
| Elementary Schools (Total No. in Brooklyn, 214) | 123 | 66 |
| Private and Parochial Schools | 25 | 22 |
| Number of Teachers | 3,818 | 2,995 |
| Number of Pupils instructed | 156,619 | 109,011 |
| *Exhibits Provided* | | |
| Number of exhibits | 29 | 9 |
| Viewed by | 89,065 | 11,200 |
| *Living Plants Placed in Schools* | | |
| Number of schools | 150 | 130 |
| Number of plants | 18,295 | 25,251 |
| *Agar (sterilized) for Class Use* | | |
| Petri dishes | 3,231 | 2,338 |
| Flasks | 34 | 10 |
| *Seed Packets for Children* | *1929* | |
| Schools | 428 | 220 |
| Teachers | 6,621 | 5,626 |
| Pupils | 264,834 | 268,519 |
| Packets | 794,500 | 705,694 |

Spring Announcement for Teachers and School
Bulletin Boards

Please Post

## BROOKLYN BOTANIC GARDEN

# Lessons, Lectures, and Field Trips

on

# Nature Study, Geography, and Gardening

### APRIL 9 to JUNE 10, 1929

### TO BE GIVEN AT THE BOTANIC GARDEN

*Grades 4A and 4B*

1. Spring Wild Flowers. (Lantern slides.)
2. Our Garden Flower Friends. (Lantern slides.)
3. Seedlings. (Experiments.)
4. Trees, Their Spring Aspect. (Lantern slides and field work.)
5. Nature Stories. (Limited to one class.)

*5A and 5B Grades*

6. How Soil is Made. (Experiments.)
7. Seeds: How to Plant and Care for Them. (Demonstration.
8. World's Markets: Fruits and Vegetables. (Lantern slides, Economic Greenhouse.)
9. Distribution and Cultivation of Food Crops. (Lantern slides.)
10. How Nature Plants Her Seeds. (Lantern slides and specimens.)
11. Tropical Plants. (Lantern slides and specimens.)

*Grades 6A and 6B*

12. Indoor Gardens. (Demonstration material.)
    Terraria, window boxes, desert gardens, etc.
13. Spices: Their History and Geography. (Lantern slides and specimens.)
14. Garden Flowers. (Lantern slides and specimens.) Principles of Arrangement.
15. Six Common Shrubs. (Field work.)
16. Japanese Gardens: Their Legends. (Lantern slides and walk.)
17. Amazon Valley: Coffee and Rubber. (Lantern slides and specimens.)
18. How to Plan and Plant an Outdoor Garden. (Lantern slides and demonstration.)
19. Flower Protection and Conservation. (Lantern slides and field work.)

*Junior High School*

20. Plant Wealth of India. (Lantern slides and specimens.)
21. Cotton: Cultivation and Economic Importance. (Lantern slides and specimens.)
22. Story of Plant Life, by zones. (Lantern slides, greenhouse.)
23. Ecology. Study of Plant Life Common to Streams. Fields, Mountains, etc. (Field work.)
24. Germination of Seeds. (Experiments.)
25. The Function of Leaves. (Specimens and Experiments.)

*For all Grades*

26. Spring Walks Around the Grounds.

*Note.*—Principals and teachers should make appointments for classes at least one week in advance, no appointments will be made for Mondays. Cards for this may be obtained by writing to Miss Ellen Eddy Shaw, Curator of Elementary Instruction, Brooklyn Botanic Garden.

Fall Announcement for Teachers and School
Bulletin Boards

**Please Post**

## BROOKLYN BOTANIC GARDEN

# Lessons, Lectures, and Field Trips

## on

# Nature Study, Geography, and Gardening

## SEPTEMBER 25 to December 20, 1928

## TO BE GIVEN AT THE BOTANIC GARDEN

*Grades 4A and 4B*

1. Fall wild flowers every child should know. (Lantern slides, specimens.)
2. Plants for your classrooms. (Specimen plants presented to each grade.)
3. Window boxes—planting and care. (Demonstration with living material.)
4. Simple classroom experiments with plants to show how they live and work. (Demonstrations.)

*Grades 5A and 5B*

5. Common trees—their family life. (Lantern slides and field trips.)
6. Our common garden crops—simple botanical facts for everyday use. (Actual material.)
7. Grains that provide food for us—wheat, corn, rice, oats. (Lantern slides.)
8. A trip through the South—cotton, tobacco, fruits.
9. Foods of the Orient—tea, rice, spices, bamboo.

*Grades 6A and 6B*

10. South America's economic plant contributions—coffee, rubber. (Slides and motion pictures.)
11. Geographic distribution of plants. (Lantern slides.)
12. The cacao industry. (Slides and motion pictures.)

*Grades Junior High For all School*

13. Ecologic factors in plant life. (Field trips.)
14. Plant life as seen in the Botanic Garden greenhouses.
15. Plant life from infancy to old age.
16. Indoor Culture of bulbs. (Demonstrations.)
17. Plant propagation. (Greenhouse Demonstrations.)
18. Flowers and flower arrangements. (Demonstrations with materials.)
19. Fall trip around the grounds.
20. The Japanese Garden—its significance.
21. Birds and their value to man.
22. Nature's Thanksgiving dinner. (Given November 21–28.)
23. Christmas greens—old tales and fables. (Given December 12–20.)

*Note.*—Principals and teachers should make appointments for classes at least one week in advance, no appointments will be made for Mondays. Cards for this may be obtained by writing to Miss Ellen Eddy Shaw, Curator of Elementary Instruction, Brooklyn Botanic Garden.

## Guide Sheet No. 1a[1]

### BROOKLYN BOTANIC GARDEN

### Department of Elementary Instruction

## AN EARLY SPRING WALK

Leaving the building, turn left past the Lily Pools and take the path to the right.

Look carefully in the grass beside the road. Those round, green shoots are Tulips coming up. Keep to your right past the Barberries. Do you know the name of the tiny white flowers fenced in on your left? They are the very first to bloom in the spring and are therefore called Snowdrops. They were there in February before we had our last snowstorm.

You will notice a hill at your right. Do you see some flat green blades coming up through the grass? These are the leaves of the Daffodils and soon the hill will be yellow with their flowers. Just before you come to the boulder bridge, you will see growing close to the ground the Adonis with its queer-looking yellow flowers.

Cross the bridge and turn to your left. Soon you will reach the Rock Garden where there are several interesting little plants in bloom. Up on the bank close to the stone path are some pale lavender Crocuses with bright yellow centers. Watch carefully on your left as you walk along the road. Do you see the Scilla, that little blue bell-shaped flower? Now look away ahead of you. The bright orange flowers that you see are also Crocuses. Most of these are orange, but do you see a white one and also one or two purple ones at the right?

Now if you will walk straight ahead you will come to the Flatbush Avenue gate. But if you are coming back to the building, turn around the corner to your left and you will find, in a little fenced-in area near the boulder bridge, some other yellow flowers. Are these crocuses also? Look carefully and see if you can tell. [*Note:* These flowers were Winter Aconite (*Eranthis hyemalis*).]

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[1] When a class from a school is conducted about the Garden the teacher and each member of the class are given a copy of the corresponding Guide Sheet.

### Guide Sheet No. 1b

## BROOKLYN BOTANIC GARDEN

### Department of Elementary Instruction

# AN EARLY SPRING WALK

You can't choose any route around the Garden today without seeing some plant in bloom.

Notice the Willows and Maples in bloom as you stand away from them.

If you go out past the lily pool and turn to the left, you find all the space between the road and the brook in bloom. The Chinese Cherry is still a rosy cloud. Farther on, examine the tiny pink buds of Flowering Almond. They will be out in a few days. Near them is a row of white Flowering Cherries.

Near the stone bridge, see the Red Buckeye tree with huge coral buds. Just beyond the bridge is a Poplar with long red tassels.

Drifts of yellow Forsythia are everywhere. Toward the Flatbush gate the Swiss Heath is showing modest wee pink blossoms.

The Crocuses, white and purple, are still with us.

In the Rock Garden, blue and white Scilla (Squills) are in bloom—also the white Anemone, pink Saxifrage, Viper's Bugloss and yellow Trollius (Globe Flower).

Beyond the Rock Garden, yellow early Tulips are blooming in the tulip beds.

The Daffodils on Boulder Hill and down the walk are beginning to come out.

And did you ever see anything lovelier than the Magnolia Triangle?

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### Guide Sheet No. 2

## BROOKLYN BOTANIC GARDEN

### Department of Elementary Instruction

# A LATE SPRING WALK

Leave the main entrance of the Laboratory Building and turn left past the lily pools. Walk around the pools and take the path to the right. Look in the grass on your left and see the tulips coming up. You will pass the Chinese Cherry tree in bloom. What color are its blossoms? As you walk along you will notice the Daffodils just coming out. They are among the first flowers to bloom in the spring. Do you know any flowers that bloom earlier than Daffodils?

Next you come to the Magnolia Triangle. Notice the big blossoms and the large furry buds on these trees. As you walk around the Magnolia

Triangle look at the hillside on your left. It looks like a field of gold or sunlight. Think how many Daffodils there are there. As you walk toward the Japanese Garden notice the Forsythia bushes in bloom. Do you think these blossoms are the same color as the Daffodils?

You have come to the Japanese Garden. See if you can locate the following things in the Japanese Garden:

1. Torii.
2. Tea House.
3. The cherry tree on your left as you enter the Japanese Garden. See its pink shiny bark. Have its buds begun to turn pink yet?
4. Fagot fence.
5. Japanese Iris coming up on the right hand side of the little path.
6. Waterfalls.
7. Moonview House.
8. Shrine on the hill. Can you find the sacred foxes guarding the shrine?

Leave the Japanese Garden and turn right around the lake. Keep to this path back to the Magnolia Triangle, and after taking the path across the bridge, turn left. As you walk towards the Rock Garden see if you can find some tiny yellow tulips on your left. As you pass the Rock Garden look at the little blue Hyacinths among the rocks on the left.

After you have passed the Rock Garden, look around you to see the Willows growing along the Brook. That is where Willows like best to grow. See how light and yellow their tops are. Look at the other trees and notice the different colors of their new leaves.

## Guide Sheet No. 3

### BROOKLYN BOTANIC GARDEN

### Department of Elementary Instruction

## A FALL WALK

Leave the Laboratory Building and turn to your right. When you come to the Lake stop and notice some of the things in the Japanese Garden.

1. The Torii.
   Archway standing in the water. Do you know what it means in Japan?
2. Lotus Plants, the Sacred Flower, growing in the water.
   Notice how the seed pods bend over the water.
3. Sacred Cranes.
   Standing in the water.
4. Tea House and Arbor.

Enter the garden and notice as you walk past the Tea House:

1. Cherry Tree in front of Tea House. Notice its bark.
2. Faggot fence.

Look closely to see how the Japanese make their "living fences."

3. Archway.

   Do you know what the Japanese writing on the archway says? "You are coming to the Flowers."

Walk through this small arch and follow the path around the Lake.

Do you see the Japanese Iris plants growing by the Lake? Keep to your left and you will come to

1. Moonview House.

   Why is it called that?
2. Island.

   Why are the cranes there?
3. "Snow Shed" Lantern on the island.

   Why is it named that?
4. Drum Bridge.

   Leading to the island from the mainland. Notice the reflection and you will see why it is called a "Drum" bridge.
5. Stepping stones to Island.

   Notice how the stones are arranged.

After you have left here you will soon come to the first waterfall.

The garden is divided into three levels:

1. Heaven.

   The highest hill, in the distance.
2. Man.

   The medium height hill, near the center of the Garden.
3. Earth.

   Indicated by the two large boulders on the edge of the Lake.

Cross the large bridge and, as you proceed on the path to your right, you will see the Inari *Shrine* on your left. Inari is a sect of Shintoism, one of the religions of Japan. This is where the Japanese pray.

After you have passed the shrine and the second waterfall, you will take a sharp turn to your left and walk up on the hill, the highest part of the Garden, which is the hill "Heaven." From here we proceed to the Shrine. Notice

1. Stone foxes before the Shrine.

   Inari is the sect of the fox, a very primitive kind of religion.
2. Lantern.

   To light the path for the worshipper.

Come back to the Lake and take the path to your right. Walk straight across the grounds past the outlet of the Lake and along the stream. When you reach the road leading to the main building turn to your right across the bridge and walk toward the Rock Garden. After passing the Rock Garden—

Notice the Dahlias on your left. In front of the Dahlias, and further along on your left is a gorgeous display of many colored Chrysanthemums.

## Guide Sheet No. 4

### BROOKLYN BOTANIC GARDEN

### Department of Elementary Instruction

## A WINTER WALK

Leave the front door and walk straight out to the Magnolia Triangle.

1. Examine the buds to see how they are prepared for winter. ..........
..............................

2. Turn to the left and go to the group of Oaks. All oaks have bunches of terminal (end) buds. How do the branches of these oaks grow? ......
..............................

3. Walk north, facing the Museum. On the hill are Sycamores. What do you notice about the bark? Can you see any "button-balls" on the trees? ............................ These are the fruit. Looking at the young twigs you will notice that they are zigzag, and that the buds are alternate. Can you see a little rim around each bud where the leaf fitted over it? ............................

4. On top of the hill are Austrian Pines, evergreens. How many needles in a bunch? ............................ What are the twigs and bark like? ............................

5. What color bark has the Gray Birch? ............................ What are the twigs like? Can you find the young *catkins?* .............
..............................

Cross the little bridge over the Brook near the fern beds.

6. At the left of the path is a Linden. Look up into it to see how the twigs grow. What are the winter buds like? ..........................

7. Follow the path north up the steps until you come to a Beech tree at the right. What is the color of its bark? ............................ Look at the buds. How can you always tell a beech? ...................
..............................

8. Keep on to the right until you come to the Honey Locusts. What is the color of their bark? ............................ See if you can find any thorns. Describe them. ............................

9. Follow the road around the Japanese Garden. Look at the Ailanthus tree, and tell how you can always know it. ............................

10. Opposite the entrance to the Japanese Garden is a group of Pines. Back of them look for a Sycamore Maple. Are the buds opposite or alternate? ............................

## Guide Sheet No. 5

## BROOKLYN BOTANIC GARDEN

### Department of Elementary Instruction

# WHAT TO SEE IN THE ECONOMIC GREENHOUSE

Enter the greenhouse by the center door; take the righthand path. Directly in front of you notice the large Date Palm. There are many kinds of palms in this greenhouse; see how many you can find.

As you move slowly along the path, notice on your right:

1. *Bowstring hemp* from tropical Africa.
2. The *Coconut palm* from the Pacific Islands, the source of coconuts, shredded coconut, and copra (dried coconut).
3. The *Chocolate tree* from the American Tropics.

On your left notice:

1. *Spanish cedar,* a cousin of the nearby *Mahogany* and the principal wood used in the manufacture of cigar boxes.
2. *Mahogany,* used for fine furniture.
3. *Male bamboo,* used for both food and shelter in parts of the Orient.
4. *Pepper vine,* from which are made black and white pepper.
5. *The Mango,* a well-known tropical fruit.
6. *Sugar cane,* one of the chief sources of sugar.

In the very center of the house, notice the giant *Banana plant.*

On your right notice:

1. *Guava,* used for making paste and jelly.
2. *Oil palm;* the oil from the fruit is used in the manufacture of soap and as a lubricant.
3. "*Alligator Pear*" *tree* (*Avocado*); the fruit is an important food in Central America.

As you pass the lily pool, notice on your right:

1. *Gutta percha tree,* from the Malay Peninsula.
2. *Banyan tree,* a native of India and cousin of the fig.
3. *Rubber trees* from South America and India.
4. *Coffee trees* from the Congo, Liberia, and Arabia.

As you leave the pool, notice on your left:

1. *Mexican Breadfruit* with its curious perforated leaves. It is sometimes called "Swiss cheese plant." Why?
2. *Papaya tree;* the fruit and leaves contain a vegetable pepsin.
3. *Manila Hemp* (a kind of banana), from the Philippines, used in the manufacture of rope and binder twine.
4. *Pineapple plant.*
5. *Chinese Banana,* a dwarf kind, seldom reaching a height of more than 10 feet.
6. *Annotto,* principal source of the yellow coloring of cheese and butter.

On you right, near the end of the path notice:

1. *Orange, Lemon,* and *Citron trees;* from the latter is obtained the peel for candied citron.
2. *Vanilla,* a climbing orchid, from which we obtain vanilla extract for flavoring.

Leave the greenhouse by the center door.

# BROOKLYN BOTANIC GARDEN

## Packets of Seeds

### FOR BOYS AND GIRLS

*Price, 1 cent a packet*

Each pupil should be supplied with one of these slips, and should mark in the blank columns the number of packets wanted. The slip should be retained by the teacher as a memorandum until the seeds are delivered to the pupil.

### Flower Seeds

| No. of Packets | Name | Color and Height | No. of Packets | Name | Color and Height |
|---|---|---|---|---|---|
|  | Alyssum, Sweet | White 6 in. |  | Marigold Tall | Yellow 12 in. |
|  | Aster | Mixed Colors 12 in. to 18 in. |  | Morning Glory | Mixed 10 to 20 ft. |
|  | Calendula | Yellow 1 to 2 ft. |  | Nasturtium Dwarf | Yellow 8 to 12 in. |
|  | Cornflower (Bachelor's Button) | Blue 18 to 24 in. |  | Nasturtium Tall | Yellow 5 ft. |
|  | Four O'Clock | Red; Yellow 30 in. |  | Phlox Dwarf | Various 1 ft. |
|  | Garden Pink (Dianthus) | Pink 20 to 24 in. |  | Sunflower | Yellow 5 to 8 ft. |
|  | Marigold Dwarf | Yellow 6 to 8 in. |  | Zinnia | Various 1 to 2 ft. |

### Vegetable Seeds

| No. of Packets | Name | Time to Plant | No. of Packets | Name | Time to Plant |
|---|---|---|---|---|---|
|  | Beans, Bush | May 1st |  | Onion | April |
|  | Beet | Early April |  | Radish | April to September |
|  | Carrot | Late April |  | Sweet Corn | May 20 to July 20 |
|  | Kohlrabi | April to July |  | Tomato | Start Indoors |
|  | Lettuce | April to August |  | Turnip | April to August |

Total Number of Packets ........... Amount Enclosed ........... cents
Name ..........................................................
Address .......................................................
School No. ............ Grade ............

ORDERS MUST BE IN BY APRIL 1

# BROOKLYN BOTANIC GARDEN

## PACKETS OF SEEDS

*Teachers Order Blank*

*Price, 1 cent a packet*

Each pupil should be supplied with an individual Seed Packet List, and should mark in the blank columns the number of packets wanted. The slip should be retained by the teacher as a memorandum until the seeds are delivered to the pupil. The total class order should appear on this slip.

| FLOWER SEEDS | | |
|---|---|---|
| Name | Color and Height | No. of Packets |
| Alyssum, Sweet | White<br>6 in. | |
| Aster | Mixed Colors<br>12 in. to 18 in. | |
| Calendula | Yellow<br>1 to 2 ft. | |
| Cornflower (Bachelor's Button) | Blue<br>18 to 24 in. | |
| Four O'Clock | Red; Yellow<br>30 in. | |
| Garden Pink (Dianthus) | Pink<br>20 to 24 in. | |
| Marigold Dwarf | Yellow<br>6 to 8 in. | |
| Marigold Tall | Yellow<br>12 in. | |
| Morning Glory | Mixed<br>10 to 20 ft. | |
| Nasturtium Dwarf | Yellow<br>8 to 12 in. | |
| Nasturtium Tall | Yellow<br>5 ft. | |
| Phlox Dwarf | Various<br>1 ft. | |
| Sunflower | Yellow<br>5 to 8 ft. | |
| Zinnia | Various<br>1 to 2 ft. | |
| Total Flower Seed | | |

ORDERS MUST BE IN BY APRIL 1

| VEGETABLE SEEDS | | |
|---|---|---|
| Name | Time to Plant | No. of Packets |
| Beans, Bush | May 1st | |
| Beet | Early April | |
| Carrot | Late April | |
| Kohlrabi | April to July | |
| Lettuce | April to August | |
| Onion | April | |
| Radish | April to September | |
| Sweet Corn | May 20 to July 20 | |
| Tomato | Start Indoors | |
| Turnip | April to August | |

| | |
|---|---|
| Total Vegetable Seed | |
| Total Flower Seed | |
| Total Vegetable Seed | |
| Grand Total | |
| Amount Enclosed | $ |

Check ☐ Money Order ☐ Cash ☐

Name ..................................................................

Address ..................................................................

School No. ............ Grade ............

## PENNY PACKETS OF SEEDS

### Faces of Seed Envelopes

BROOKLYN BOTANIC GARDEN

**Packets of Seeds for School Children**

**LETTUCE**

**Directions for Planting**

*Date:* April to August.
*Place:* In the garden or in a large box.
*Manner:* In rows, 1 foot apart. Plants should be 8 inches apart.
*Depth:* ¼ inch.

50M–7–27

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BROOKLYN BOTANIC GARDEN

**Packets of Seeds for School Children**

**ASTER**

**Directions for Planting**

*Date:* Indoors in April. Transplant to garden about the middle of May. Sow outdoors in May.
*Place:* Requires rich soil, open position.
*Manner:* Plant in groups or in rows 1 foot apart.
*Depth:* ¼ inch.
*Height:* 1 to 2 feet.

140M–7–27

BROOKLYN BOTANIC GARDEN

## Lectures for School Classes

## In Nature Study, Geography, and Botany

**Do not lose this Syllabus. Take it home to study. Paste it in your notebook.**

SYLLABUS No. 1

# RUBBER

**Source:**

A milky juice, called *latex,* flows from certain trees, shrubs, and vines. In this juicy fatty globules float. These are raw rubber, or *caoutchouc.*

**Where found:**

The *rubber belt* is a region extending 30 degrees north and south of the equator. Commercial rubber comes from a belt extending only 10 degrees north and south of the equator.

**Rubber Countries:**

Brazil in South America; Africa; Malay Peninsula; Ceylon; and the East Indies.

**Original Method of Collection:**

A diagonal or horizontal cut is made in the bark. The latex is collected in a cup. A fire is built of palm nuts. A wooden paddle dipped into the latex is held over the fire. The raw rubber hardens on the paddle. This process is continued until a big *rubber biscuit* is formed. The biscuit, cut from the paddle is dried in the sun.

**Origin of Modern Rubber Plantations:**

In 1876, 70,000 seeds of the Brazilian rubber tree (*Hevea*) were shipped by an Englishman to London and there planted in hot houses. Only 4 in each 100 germinated. About 2,000 of the seedlings were distributed to Ceylon, Malay and the islands of the East Indies. These plants are the ancestors of all the trees in the rubber plantations of the world, outside of Brazil.

**Great Discoveries:**

Columbus, during his second voyage to the new world, saw children playing with crude rubber balls on the Island of Hayti.

A scotchman made waterproof cloth by spreading rubber dissolved in naptha between two sheets of cloth. His name was Charles McIntosh, hence the name "mackintosh" for raincoats.

In 1839, Charles Goodyear, a Connecticut man, discovered that rubber, mixed with sulphur and then exposed to heat for a short time, would lose its unpleasant sticky quality, and also be able to stand hard usage. This process he named *vulcanization*, from Vulcan, the god of fire. This is the most important process of the rubber industry.

In 1879, the first seedling rubber plantations were started in Ceylon and southern India.

**Interesting Facts About Rubber:**

At the Brooklyn Botanic Garden you saw the Para rubber plant (*Hevea*), and four other kinds.

The rubber industry is the fourth largest industry in our country.

Two-thirds of all the rubber sold in the world goes to the United States.

Four-fifths of all rubber used in America is made into automobile tires.

Fifty thousand different articles are made of rubber.

In 1920, the world's production of rubber was estimated at 400,000 tons. Of this amount, 360,000 tons were produced on plantations. The remainder was obtained from smaller plantings and from wild trees.

The total area of land planted to rubber exceeds 3,200,000 acres, or 5,000 square miles, equal to about two and one half times the land area of Long Island.

BROOKLYN BOTANIC GARDEN

# Lectures for School Classes

# In Nature Study, Geography, and Botany

**Do not lose this Syllabus. Take it home to study. Paste it in your notebook**

## SYLLABUS NO. 3

# TEA

**Source:**

The leaves and tender twigs of the tea plant, *Camellia Thea.* There are two varieties: *viridis,* the chief source of green tea; and *bohea,* from which black tea is derived. The tea plant is related to the flowering plant *Camellia,* and to the violets.

**Description of Plant:**

*Camellia Thea* is a tree from 20 to 30 feet high: under cultivation it is pruned to a shrub of from 3 to 6 feet in height. The flowers look a little like apple blossoms, are fragrant and borne in the axils of the leaves. Each flower usually produces three seeds, which are about the size of a hazel nut, spherical, hard, dark brown to black in color. The leaves are from two to six inches long and are evergreen.

**Tea Countries:**

The big six are the following: China, India, Ceylon, Java, Japan, and Formosa.

**Kinds of Tea:**

Black or fermented (*bohea*): green or unfermented (*viridis*).
Japan produces only green tea.
China produces both green and black tea.
Ceylon, India, and Java produce largely black tea.
Formosa produces a semi-fermented tea (*Oolong*).

**Culture:**

The tea plant loves the mountains. It requires a light, loamy soil. The plant is raised from seed outdoors in a seed bed or nursery. When the plants are a year old they are transplanted in groups of from four to six plants to rows about four feet apart. The plant yields its first crop at the end of its third year, and thereafter yields three or four crops annually.

## Preparation for Market:

The leaves are picked with great care so the stem or stalk will not be harmed. In the manufacture of black tea (*Orange Pekoe, Pekoe, Souchong,* etc.) the leaves are allowed to ferment for a while, then the fermentation is quickly stopped at just the right moment by rapid heating or "firing." In making green teas (*Young Hyson, Gunpowder,* etc.), the leaves are fired as soon as picked to prevent all fermentation. *Oolong Tea* (made chiefly in the island of Formosa) is a fermented tea, but the fermentation is not allowed to continue as long as in the manufacture of black tea. After firing, the tea leaves are rolled by hand or machine, often fired again, and then sorted, separating the fine leaves from the coarse. The tea is then boxed for shipping.

## Facts About Tea:

You do not have to go to one of the countries we called the "big six" to see a tea plant. All you have to do is to take a trolley to the Brooklyn Botanic Garden and there you will find a tea plant growing in the conservatory.

Tea was raised for some years in South Carolina but it is not at the present time.

England uses about 6½ lbs. to 7 lbs. of tea yearly per person, while the United States uses not quite 1 lb. per person.

Everyone drinks tea in Japan: she consumes as much tea as she exports.

Tea is mentioned in China as far back as 2700 B.C. It was introduced into India from China by Colonel Kyd in 1780. India exports more tea now than does China.

Tea is blended or mixed to obtain better flavors.

No artificially colored tea is allowed to enter the United States.

Tea contains *thein* which is practically the same as the *caffein* of coffee.

BROOKLYN BOTANIC GARDEN

## Lectures for School Classes In Nature Study, Geography, and Botany

**Do not lose this Syllabus. Take it home to study. Paste it in your notebook.**

SYLLABUS NO. 6

# CHOCOLATE AND COCOA

**Source:**

The cocoa of commerce is the ground seed of the cacao tree, *Theobroma cacao.* It belongs to the Sterculia family (Sterculiaceae), and is related to the mallows. The name, *Theobroma,* comes from two Greek words meaning " food for the gods."

**Where found:**

The cacao tree is a native of the shady forests of northern South America, but it has been grown for several centuries in the tropical parts of South and Central America and the Antilles. It is now grown in practically all the tropical countries of the world.

**Description of Plant:**

The cultivated cacao is a small shade-loving tree about the size of our peach trees. It produces its flowers and fruits in a curious manner. The small branches and twigs bear only leaves, while the inconspicuous yellow and purple flowers spring in clusters from points on the bark of the trunk and larger branches. The fruit when mature, is a pod 6–10 inches long marked with longitudinal ribs. The texture of the skin is like that of a thin-skinned squash: the color varies from lemon yellow to deep red.

**Culture:**

The cacao plant thrives best in a rich, moist, humus soil, and warm, even temperature, so it can only be grown in the tropics. Shade must be afforded the young growing trees, and this is done in the plantations by planting various quick growing trees alternately with the cacao trees.

**Fruiting:**

The cacao tree begins to bear fruit at the age of six years and continues its period of bearing for about fifty years. A bearing tree in good condition will yield a pound to two pounds of dried cacao beans in the two main harvests, at the beginning and middle of the year, although the pods keep ripening continuously throughout the year.

### Preparation for Market:

When ripe, the pods are picked and gathered into piles where the natives break off the outer casing and take out the seeds. In a well-filled pod there may be fifty seeds attached to a central core and covered with a soft mucilaginous pulp. This pulp is completely destroyed by fermentation, after which the beans are slowly dried in the sun. The cacao beans are then put in sacks and shipped to the chocolate factories.

### Manufacture:

In the factory the beans are first freed of the outer shell by crushing, then the kernels are roasted in iron cylinders to bring out the aroma, to modify the bitter taste, and to improve the color. The kernels may then be ground into a dark brown paste, pressed into cakes which we know as bitter chocolate, or they may be ground, treated with sugar, milk, and flavoring matter to make the sweet chocolate of commerce. About one half of the cacao bean by weight consists of cocoa fat or butter. In preparing cocoa this is largely removed. Cocoa butter is used in the manufacture of perfumes, toothpaste, and the creams of chocolate candy.

### Facts About Cocoa:

Long before the discovery of America cacao was used and cultivated from Mexico to Ecuador. It was first brought to Europe by Cortez the Spanish explorer in 1519.

The cacao beans were used as money in old Mexico.

The United States ranks first of all the countries of the world in the consumption of cocoa and chocolate.

Cocoa and chocolate in addition to their stimulating effects should be regarded as real foods. The action of cocoa on the nervous system is far less than that of tea or coffee.

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## GENERAL INFORMATION

MEMBERSHIP.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, Brooklyn, N. Y.* Telephone, 6173 Prospect.

THE BOTANIC GARDEN is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays open at 10 a.m.

ENTRANCES.—On Flatbush Avenue, near Empire Boulevard (Malbone Street), and near Mt. Prospect Reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Montgomery Street.

TO ASSIST MEMBERS and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one week in advance. No parties of less than six adults will be conducted.

TO REACH THE GARDEN take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, and Tompkins Avenue trolleys to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street and Vanderbilt Avenue trolleys to Prospect Park Plaza and Union Street.

# PUBLICATIONS

## OF THE

## BROOKLYN BOTANIC GARDEN

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly beginning with 1929. Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, announcements of courses of instruction, seed list, guides, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others $1.50 a year, 25 cents a number. Circulates in 41 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Circulates in 47 countries.

Volume I. *Dedication Papers:* comprising 33 scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. 521 pages. Price $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. Price $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor, June 10, 1927. 151 pages. Price $1.60.

CONTRIBUTIONS. Established, April 1, 1911. Papers originally published in periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume. Circulates in 34 countries.

*52. Inheritance studies in Pisum. VI. Multiple allelomorphism and the inheritance of green and yellow foliage and pod color.* 16 pages. 1927.

*53. Mutation, adaptation to temperature differences, and geographical distribution in plants.* 12 pages. 1928.

*54. The vegetation of the Allegany State Park.* 121 pages. 1928.

*55. Physiologic races of bunt of wheat.* 14 pages. 1928.

*56. The inheritance of resistance of oat hybrids to loose and covered smut.* 48 pages. 1928.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the *Record;* see above.

SEED LIST. (*Delectus Seminum*) Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 143 botanic gardens and institutions located in 42 countries.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in coöperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription, $7.00 a year. Circulates in 48 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $4.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly. Subscription, $6.00 a year. Circulates in 37 countries.

BROOKLYN BOTANIC GARDEN RECORD

VOL. XVIII SEPTEMBER, 1929 NO. 5

# PROSPECTUS

## OF COURSES, LECTURES, AND OTHER EDUCATIONAL ADVANTAGES OFFERED TO MEMBERS AND TO THE GENERAL PUBLIC

## 1929-30

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* Resigned, September 1, 1929.

# INFORMATION ABOUT THE BROOKLYN BOTANIC GARDEN

The Brooklyn Botanic Garden, established in 1910, is a Department of the Brooklyn Institute of Arts and Sciences. It is supported in part by municipal appropriations, and in part by private funds, including income from endowment, membership dues, and special contributions. Its articulation with the City is through the Department of Parks.

By an Agreement with the City of New York, the functions of the Garden have been defined as two-fold, and may be summarized as follows: first, the advancement of botanical science through original research; and, second, the dissemination of a knowledge of plants.

The first of these activities is carried on by director, curators, resident investigators, fellows, and others, who devote all or a part of their time to independent investigation.

The second, the dissemination of botanical knowledge, is accomplished in the following ways:

I. By the teaching of classes—
    a. of children who come voluntarily outside of school hours;
    b. of children who come with their teachers from public and private schools for special lessons on plant life and closely related subjects;
    c. of adults who are interested in some phase of pure or applied botany.
II. By lectures at schools and elsewhere by the various staff members.
III. By broadcasting.
IV. By loan sets of lantern slides accompanied by lecture text, for use in the schools.
V. By the distribution to schools of study material for classes in botany, biology, and nature study.
VI. By public lectures and educational motion pictures at the Botanic Garden.

VII. By maintaining labelled collections of living plants, arranged systematically and otherwise on the grounds and in the Conservatories of the Garden.

VIII. By the herbarium, containing specimens of preserved plants from all parts of the world.

IX. By maintaining a reference library on plant life and related subjects, open free to the public daily (except Sundays and holidays).

X. By the following periodicals, published by the Botanic Garden:

1. American Journal of Botany.
2. Ecology.
3. Genetics.
4. Brooklyn Botanic Garden Record, including Guides.
5. Leaflets.
6. Contributions.
7. Memoirs.

XI. By popular and technical articles in journals and the public press.

XII. By the maintenance of a Bureau of Public Information on all phases of plant life.

XIII. By providing docents to accompany members and others who wish to view the collections under guidance.

XIV. By cooperating with City Departments and other agencies in the dissemination of botanical knowledge.

The Brooklyn Botanic Garden is also taking an active part in the State-wide movement for legislation for the conservation of our native American plants.

A brief summary and report of the public educational work of the Garden from 1910 to 1928, with some attempt to set forth the fundamental principles upon which it is based, was published in the Brooklyn Botanic Garden RECORD for July, 1929. On request, copies will be sent gratis to those engaged in educational work.

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BROOKLYN BOTANIC GARDEN RECORD

VOL. XVIII SEPTEMBER, 1929 NO. 5

# PROSPECTUS: 1929–30

## I. COOPERATION WITH LOCAL SCHOOLS

The Brooklyn Botanic Garden aims to cooperate in every practicable way with the public and private schools of Greater New York in all matters pertaining to the study of plants and closely related subjects. The purpose of the Garden in this connection is to supplement and enrich the school work in the way of instruction, demonstration, methods, study material, etc., which otherwise would not be available.

Geography classes, as well as classes in nature study and botany, are finding the collection of useful plants in the economic plant house, and also the Japanese Garden, valuable adjuncts to their class work. Arrangements may be made by teachers of geography to have their classes study these collections under guidance. Illustrated lectures for geography classes may also be arranged for at the Garden.

The systematic collection in the main part of the Garden, where the living plants are arranged by orders and families, is proving of great value for demonstration to visiting high school classes in botany.

**A. Talks at Schools.**—The principals of public or private schools may arrange to have lantern talks given at the schools on various topics related to nature study, such as garden work with children, tree planting, and Arbor Day. If an illustrated lecture is desired, the lantern and operator must be provided by the school, but slides will be furnished by the Botanic Garden. Address the *Curator of Elementary Instruction* for a list of talks and for appointments.

**B. School Classes at the Garden.**—(*a*) Schools not provided with a stereopticon, and other schools, may arrange for classes, accompanied by their teachers, to come to the Botanic Garden for lectures either by the teacher or by a member of the Garden Staff.

(*b*) Notice of such a visit should be sent at least *one week* previous to the date on which a talk is desired. Blank forms are provided by the Garden for this purpose. These talks will be illustrated by lantern slides, and by the conservatory collection of useful plants from the tropics and subtropics. Spring and fall announcements of topics will be issued during 1929–30.

(*c*) The Garden equipment, including greenhouses, plant material, lecture rooms, lantern and slides, is at the disposal of teachers who desire to instruct their own classes at the Garden. Arrangements must be made in advance so that such work will not conflict with other classes and lectures. For High School classes address the *Curator of Public Instruction.* For Junior High and Elementary School classes address the *Curator of Elementary Instruction.*

(*d*) The principal of any elementary or high school in Brooklyn may arrange also for a series of six lessons on plant culture to be given during the fall or spring to a class. These lessons will be worked out for the most part in the greenhouse. Such a course must be arranged for in advance, and the class must be accompanied by its teacher. This is adapted for pupils above the third grade.

**C. Seeds for School and Home Planting.**—Penny packets of seeds are put up by the Botanic Garden for children's use. In the early spring, lists of these seeds and other information may be secured on application to the *Curator of Elementary Instruction.*

**D. Conferences.**—Conferences may be arranged by teachers and principals for the discussion of problems in connection with gardening and nature study. Appointments must be made in advance. Address Miss Ellen Eddy Shaw.

**E. Study and Loan Material.**—To the extent of its facilities, the Garden will provide, on request, various algae and protozoa, as well as living plants, leaves and twigs, or other plant parts for study. Where containers are necessary, as in the case of the algae and protozoa, they must be furnished by the school. Petri-dishes will, on request, be filled with sterilized nutrient agar ready for use in the study of bacteria and molds. They should be delivered to the Garden, *clean,* and in general one week before the agar is desired. In all cases arrangements must be made by the teachers for calling for such material.

MATERIAL USUALLY AVAILABLE

1. Protozoa: Paramoecium and others.
2. Pleurococcus.
3. Spirogyra.
4. Vaucheria.
5. Blue-green algae.
6. Moss plants: gametophyte and sporophyte, with capsules.
7. Fern prothallia. For these, a Petri dish with a cover is the best container to bring, since the prothallia dry out quickly.
8. Fern sporophylls (with sori).
9. Geranium, Coleus and Tradescantia—variegated green and white, loaned for photosynthesis experiment.
10. Cacti, Pitcher plant, Selaginella and others—loaned for demonstration.
11. Elodea—to show movement of protoplasm.
12. Various collections loaned for exhibit: *e.g.,* lichens, fungi, plant diseases, fruits, modified leaves, demonstrations of Mendel's law.

**F. Demonstration Experiments.**—Teachers may arrange to have various physiological experiments or demonstrations conducted at the Garden for the benefit of their classes. Communications in regard to these matters should be addressed to the *Curator of Public Instruction.*

**G. Loan Sets of Lantern Slides.**—Sets of lantern slides have been prepared for loan to the schools. Each set is accompanied by a short syllabus of explanatory nature. In all cases these sets must be called for by a special messenger and returned promptly in good condition. The subjects now available are as follows. Other sets are in preparation.

1. Plant Life
2. Spring Wild Flowers
3. Common Trees
4. Fall Wild Flowers
5. Forestry (2 sets)

## II. DOCENTRY

To assist members and others in studying the collections the services of a docent may be obtained. Arrangements must be made by application to the Curator of Public Instruction at least one week in advance. No parties of less than six adults will be conducted. This service is free of charge to members; to others there is a charge of 50 cents per person. For information concerning membership in the Botanic Garden see page 3 of the cover of this PROSPECTUS.

## III. COURSES OF INSTRUCTION

### A. Children's Garden: Nature Study

For the work in Children's Gardening and Nature Study the following equipment is available:

1. *The Children's Garden,* on a piece of land about three-quarters of an acre in extent, in the southeast part of the Botanic Garden, divided into about 150 plots which are used throughout the season for practical individual instruction in gardening.
2. *The Children's Building,* near the north end of this plot, containing rooms for consultation and for the storage of tools, seeds, notebooks, special collections, etc.
3. *The Instructional Greenhouses,* three in number, for the use of juvenile as well as adult classes for instruction in plant propagation and related subjects.
4. Three *Classrooms* (in addition to the Boys' and Girls' Club Room in the Laboratory Building), equipped with stereoscopes and views, a stereopticon, plant collections, economic exhibits, models, and other apparatus and materials for instruction.
5. Two *Laboratory Rooms,* with the usual equipment for plant study.
6. The *Auditorium,* on the ground floor, capable of seating 570 persons, and equipped with a motion-picture lantern and stereopticon.

In addition to these accommodations, the dried plant specimens in the herbarium and the living plants in the conservatories and plantations are readily accessible, while the main library and children's library, which contain a comprehensive collection of books on every phase of gardening and plant life, may be consulted freely at any time.

### 1. *Courses for Children*

The following courses are open to all boys and girls. Enrollment in these courses entitles the boy or girl to membership in the Boys' and Girls' Club of the Brooklyn Botanic Garden. This club, having an active membership of about 1,000, meets twelve times a year for discussion of subjects related to plant life. Papers, by members, on various botanical and horticultural subjects, are read at these meetings, and the speakers are then entitled to a silver pin, providing they have satisfactorily completed courses of study at the Garden extending over at least six months. For announcement concerning Children's Room see page 280.

**A1. Fall Greenhouse Work.**—The following courses are self-explanatory and are for both beginners and advanced students:

Class A.—Open to boys and girls who have never taken any greenhouse work before. Bulbs used: narcissus, oxalis, primrose; also geranium cuttings. *Saturday* mornings at 9:15. *Fee, fifteen cents. October 26 to December 21.*

Miss Sargent and Miss Marcy.

Class B.—Open to boys and girls over thirteen years of age. Subjects studied: hyacinth, Easter lily, calla lily, the botany of common cultivated plants, etc. *Fee, fifteen cents. Saturday* mornings at 9:15, *October 26 to December 21.*

Mrs. Bartlett and Mrs. MacColl.

Class C.—Open to boys and girls who have been in at least two fall bulb classes before this. The bulbs used will be hyacinth, tulip, narcissus, oxalis. Geranium cuttings and primroses will also be used. Time of class, 10:30, *Saturday* mornings. *Fee, fifteen cents. October 26 to December 21.* Mrs. Bartlett.

Class D.—Open to any boy or girl. Subject: the making of garden Christmas presents. There will be a choice of gifts. Some of the articles made will be the following: a flower basket, seed packet, flower book-mark, painted pot and plant to go in it, flower calendar, wooden box with flower design, etc. *Saturday* mornings at 10:30. *Fee, fifteen cents and cost of materials. October 26 to December 21.*

Miss Sargent, Miss Marcy, and Mrs. MacColl.

Class E.—Silver Pin work as applied to greenhouse and garden work. The members of this class will be selected from students eligible for this work. Given in January and February, 1930. *Fee, twenty-five cents.* Mrs. Bartlett.

**A2. Junior Gardeners' Course.**—This is a course for boys 14–17 years of age. Lessons are given in the care of border and other flower beds, in the weeding and care of small vegetable gardens, in mowing and watering lawns, repotting plants, etc. This is planned to fit boys for summer work and to enable them to obtain positions. Hours to be arranged. *Fee, fifty cents.*
Miss Sargent.

**A3. Preparation for the Outdoor Garden.**—The following classes are open to boys and girls during the spring of each year. The courses are planned for a better understanding of plant life and so that the outdoor garden may become a more intelligent piece of work. On account of limited space in the Children's Greenhouse, classes are limited to twenty. The fee for each course is *fifteen cents* to cover the cost of material.

Boys' Spring Course.—(a) *Saturday* mornings, 9–10:15, *March 1 to April 12.* (b) *Saturday* mornings, 10:30–11:30, *March 1 to April 12.* Mrs. Bartlett and Miss Marcy.

Girls' Spring Course.—(a) *Saturday* mornings, 9–10:15, *March 1 to April 12.* (b) *Saturday* mornings, 10:30–11:30, *March 1 to April 12.* Miss Sargent and Mrs. MacColl.

**A4. Advanced Work for Older Boys and Girls.**—How to raise plants, mix soils, transplant, start seedlings for outdoor gardens, etc. Boys and girls who have taken spring courses under A5 are eligible for advanced work. The fee for the course is *twenty-five cents.* Each student may take home his plants and seedlings. This course is open to both boys and girls over twelve years of age. *Saturday* mornings at 9:30, beginning *February 1.*

**A5. The Beginners' Garden.**—Open annually to 50 boys and girls who have never had instruction in gardening at the Brooklyn Botanic Garden. This course takes up the subject of the small garden, what to plant, how to plant it, care, replanting, etc. *Application for plots should be made in person or in writing before March 1.* Size of plots 8 ft. by 10 ft. All crops belong to the individual. *Fee, twenty-five cents. Saturday* mornings, 9–12, *May 10 to October 4.* Miss Sargent and Assistants.

**A6. Second Year Gardens.**—Open to 50 boys and girls who have had one or more seasons at the Brooklyn Botanic Garden—a continuation of Course A5. Registration should be made before September 1 of each year for the following year. *Fee, twenty-five cents. Saturday* mornings, 9–12, *May 10 to October 4.*
Miss Sargent and Assistants.

**A7. Junior Garden Assistants.**—Open to older boys and girls, or to those who have mastered Courses A2 and A4. Size of plot 10 ft. by 20 ft. These gardens are for the raising of vegetables. The work is in the nature of a project, "How much can one raise on a plot 10 ft. by 20 ft.?" Hours to be arranged. The student must put in at least two periods a week during the summer vacation, and, if possible, three. Registration date: *April 5. Fee, fifty cents.* Miss Sargent.

**A8. Advanced Nature Work.**—A course designed for those older boys and girls who have taken Courses A1–A5. Herbarium specimens will be prepared and the simpler principles of plant classification studied. Projects will be assigned to individuals. *Open only to pupil assistants of the Garden.* Hours to be arranged. *No fee.* Miss Shaw.

**A9. Nature Study for Boy Scouts, Girl Scouts, Camp Fire Girls, Scout Leaders, and Others.**—Short courses of at least four periods each, with talks, demonstrations, and field trips in the grounds of the Botanic Garden and Prospect Park to study trees, shrubs, etc. The instruction and schedule dates will be adapted to meet the needs of the various groups that apply. *Open only to groups of at least ten persons.* Hours to be arranged. *No fee.*
Dr. Graves, Miss Sargent, and Assistants.

**A10. Special Work for High School Pupils.**—A course in gardening or greenhouse work adapted for high school pupils. Classes to be arranged for by the high school teacher. *Fee for materials used.* Miss Shaw and Assistants.

### 2. *Courses for Teachers*

The following brief courses are designed primarily for teachers who wish to extend their knowledge of nature study and gardening for use in their school work, without taking the longer courses described under B, page 272. It should be noted that only the latter courses are accepted by the Board of Education for teachers' credits. *Members of the Garden* are entitled to a 50 per cent discount from the regular fee for " A " courses.

**A22. The School Garden.**—See B5, p. 273.

**A23. Spring Nature Study for the Classroom.**—Not given in 1930.

**A24. Fall Garden Work.**—Three informal lectures, with practical work in the greenhouse, are given on gardening as applied to school work in the fall. Bulbs and how to plant them in the fall, how to have thrifty house plants, window plants, and the making of window boxes for the schoolroom, are among the subjects considered. *Fee, $2. Mondays,* 4 p.m., *October 7–21.*

Mrs. Bartlett and Assistants.

**A25. Fall Nature Study.**—Three lessons. This course consists of informal talks, with demonstrations, on the nature and sources of the material necessary for fall nature study in school work. The demonstration material used in the lessons will be distributed to the members of the class. Such subjects as fruits and seeds, methods of seed dispersal, the condition of deciduous trees in winter, evergreens, etc., will be considered, the central idea being Nature's preparation for winter. *Fee, $2. Wednesdays,* 4 p.m., *October 9–23.* Miss Sargent.

## B. Courses for Teachers Given in Cooperation with the Brooklyn Teachers Association

These courses have been accepted by the Brooklyn Teachers Association, and appear in its Syllabus of Courses. On satisfactory completion of each course, the student is awarded a certificate by the Brooklyn Teachers Association, in cooperation with the Brooklyn Botanic Garden. The courses are also accepted by the New York Board of Education in lieu of credit toward higher teaching licenses, one credit being granted for each 15 hours. Credits may also be used toward advanced standing in colleges or universities. Nature materials used in the courses, and plants raised become the property of the student.

*Members of the Garden* are entitled to a 50 per cent discount from the regular fee for all " B " courses; from other persons the indicated fee is required. No course will be given when less than six apply.

**B1. General Botany.**—Thirty sessions. A course on the forms and functions of plants. All of the main groups of plants are considered, by means of informal lectures, discussions, demonstrations, and visits to the conservatories and the outdoor plantations. With a view to correlation with the other courses described below, particular emphasis is laid upon the higher plants. Optional laboratory work with the compound microscope. *Fee, $5. (Not offered in 1929–30.)*

Dr. Graves and Miss Rusk.

**B2. Nature Study.**—Thirty sessions. This course is based on the New York City outline of nature study for grades three to six inclusive. Mounts, charts, and diagrams are made. The student becomes familiar with actual material. The course is entirely practical, work being done in both field and laboratory. *Fee, $10. Mondays and Tuesdays,* 4 p.m., beginning *September 23 and 24.* Section I, *September 23,* 4 p.m. Section II, *September 24,* 4 p.m.

Miss Shaw and Miss Sargent.

**B3. Principles of Agriculture and Horticulture.**—Thirty sessions. This course is especially helpful to teachers. The principles of horticulture are considered and applied in a practical way through greenhouse, laboratory, and lecture work. The greenhouse work includes the following subjects: plant propagation by means of bulbs, rhizomes, roots, seeds, etc.; the care of the greenhouse; house plants; window-box materials; fertilizers. Insect and fungous pests, grafting, and pruning are also included from both a practical and a theoretical point of view. *Fee, $8. Wednesdays,* 4 p.m., beginning *September 25.* Mrs. Bartlett.

**B4. Pedagogy of Botany and Educational Principles of Children's Gardening and Nature Study.**—Not given in 1929–30.

**B5. Garden Practice.**—Fifteen sessions. This course is entirely practical and includes all the outdoor work of the student in his own garden, applying the principles of agriculture and gardening, work with children in the garden. *Fee, $8: for summer practice, fee $9 additional. Wednesdays,* 4 p.m., beginning *February 19.* Miss Shaw and Miss Sargent.

**B6. Field Botany.**—Thirty sessions. This is mainly an outdoor course, given in the Botanic Garden and Prospect Park, having for its chief object an acquaintance with the plants one meets with commonly in Greater New York and vicinity, including seed plants (trees, shrubs, and herbs), ferns, mosses, and hepatics, algae, and fungi. *Fee, $5. Thursdays,* 4 p.m., beginning *September 26.* Dr. Graves and Miss Rusk.

**B7. Greenhouse Work.** Thirty lessons. A course for those interested in the propagation and care of house plants. Lessons in repotting ferns; forcing blooming plants; shaping plants; plant insects and diseases; making window boxes, Wardian cases, and desert gardens, will be carried on in the greenhouses. Emphasis will be laid on problems of a practical nature. Limited to those who have taken B3. *Fee, $10. Thursdays,* 4 p.m., beginning *October 3.* Miss Shaw and Mr. Free.

## C. Courses for the General Public

The following courses are open to any one who has a general interest in plants. Teachers are welcome. They are *free to members of the Botanic Garden;** for others a small fee is required, as specified. Registration should be made with the instructor in person or by mail at least one week before the course opens, in order that adequate material, etc., may be provided. *No course will be given when less than six apply.*

### 1. *Full Year Course*

**C15. Field Botany.**—Thirty sessions. This is mainly an outdoor course, given in the Botanic Garden and Prospect Park, having for its chief object an acquaintance with the plants one meets with commonly in Greater New York and vicinity, including seed plants (trees, shrubs, and herbs), ferns, mosses and hepatics, algae, and fungi. *Fee, $5. Thursdays,* 4 p.m., beginning *September 26.* (This course is identical with B6, p. 273.)

Dr. Graves and Miss Rusk.

### 2. *Fall Courses*

**C4. Gardening in the Fall.**—Six lessons, with practical work in the greenhouse, on the methods of making cuttings, the various kinds of bulbs for fall planting, their treatment and care, the proper management of house plants, and a discussion of the kinds suitable for cultivation. *On account of restricted space in the greenhouse, this class must be limited to 40. Registration according to the order of application. Fee, $3. Thursdays,* 4 p.m., *October 3 to November 7.* Mr. Free.

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* For information concerning membership in the Brooklyn Botanic Garden consult the third page of the cover of this PROSPECTUS.

**C5. Trees and Shrubs in their Winter Condition.**—Eight outdoor lessons in the Botanic Garden and elsewhere in Greater New York on the characteristics of our common trees and shrubs, both native and cultivated, emphasizing their distinguishing features in the winter condition. *Fee, $4. Saturdays,* 2:30 p.m., *October 5 to December 7. (Omitting October 12 and November 30.)* Dr. Graves and Miss Rusk.

**C13. Fall Flowers, Fruits, and Seeds.**—Four outdoor lessons; the first in the Botanic Garden, three in the woodlands of Greater New York. The common native and cultivated plants which flower in the fall, and the fruits and seeds commonly seen at this time of the year are pointed out and their characteristics studied. *(Not offered in 1929.)* Dr. Gundersen.

### 3. *Spring Courses*

**C1. Plants in the Home.**—How to grow them. Six talks with demonstrations. Practice in potting, mixing soils, making cuttings, etc. This course deals with the principles to be followed in raising plants. The members of the class have the privilege of keeping the plants they have raised. *Fee, $3. Thursdays,* 4 p.m., *February 13 to March 13.* Mr. Free.

**C3. The Flower Garden.**—Making the most of it. Five lessons. How to improve soils and get results from planting; old fashioned flowers; annuals; summer bedding; vines for screening unsightly objects; rose culture; growing of ornamental shrubs; pruning; how to make a lawn and maintain it. *(Not offered in 1930.)* Mr. Free.

**C7. The Story of Plant and Animal Evolution.**—The parallel progress of plant and animal life through the ages, outlined in four illustrated lectures: (1) Water plants and water animals. (2) The transition from water life to land life. (3) Mesozoic life: gymnosperms and reptiles. (4) Cenozoic life: flowering plants and mammals. *Fee, $2. Fridays,* 4 p.m., *March 7–28.*
Dr. Graves and Dr. Gundersen.

**C8. Plant Families.**—Eight outdoor lessons in the Botanic Garden, taking up the structure of flowers and the characteristics of the more important plant families. *Fee, $4. Wednesdays,* 4 p.m., *April 9 to May 28.* Dr. Gundersen.

**C9. Trees and Shrubs of Greater New York.**—Ten outdoor lessons at the Garden and elsewhere in Greater New York, the principal object being to gain a ready acquaintance with the common trees and shrubs of the eastern United States, which are well represented in this region. The species are considered in systematic order, and the features pointed out by which they may be most easily recognized; also their habits, rate of growth, economic value and use, methods of planting and propagation; importance in forestry, horticulture, and landscape art. *Fee, $5. Saturdays,* 2:30 p.m., *March 29 to June 14. (Omitting April 19 and May 31.)* Dr. Graves.

**C11. Spring Flowers and Ferns of the New York Region.**—A field course of eight lessons in the parks and woodlands of Greater New York. The common native and naturalized wild flowers are studied as they come into flower, and their distinguishing features pointed out. *Fee, $4. Saturday afternoons; April 26 to June 14.* Miss Rusk.

**C12. The History of Systematic Botany.**—Three illustrated lectures. 1. Natural science of the ancients and the Middle Ages. 2. The study of plants from the discovery of America to Linnaeus and the Jussieus. 3. The idea of plant evolution in the nineteenth century and after. *(Not offered in 1930.)* Dr. Gundersen.

## D. Course for Student Nurses

**D1. General Botany with Special Reference to Medicinal Plants.**—A course of conferences, demonstrations, and field trips for student nurses. The general principles governing the life of plants, as well as the use and care of flowers in the sick room will be considered. Special attention will be paid to the identification of officinal plants in the field. Hours to be arranged. *No fee.* Dr. Graves.

## E. Consultation and Independent Investigation

### 1. *Consultation*

Consultation and advice, and the facilities of the laboratories, library, and herbarium are freely at the service of members of the

Botanic Garden and (to a limited extent) of others with special problems relating to plants or plant products, especially in the following subjects:

1. **Plant diseases** (phytopathology) and classification of fungi (mycology). Dr. Reed.

2. **Plant breeding** and allied subjects (genetics and experimental evolution). (*Not offered in 1929–30.*)

3. **Plant geography** (phytogeography) **and ecology.**

4. **Classification and identification of flowering plants** (systematic botany). Special groups studied in the Garden, supplemented by herbarium studies. Dr. Gundersen.

5. **The growing of cultivated plants** and their arrangement; also their adaptation to soils, climate, and other factors (horticulture and gardening). Mr. Free.

### 2. *Investigation* *

For the following research courses, open to those properly qualified for independent investigation, there is a charge covering all expenses, including laboratory fee, of *$30 for each full course* of 100 credit hours, and *$20 for each half course* of 50 credit hours.

**E6. Research in Mycology and Plant Pathology.**—Independent investigation of problems relating to fungi and fungous diseases of plants. Dr. Reed.

**E7. Research in Plant Genetics.**—Independent investigation of problems of variation and heredity, including that phase of cytology having a direct bearing on the subject matter of genetics. (*Not offered in 1929–30.*)

**E8. Research in Forest Pathology.**—Independent investigation of the diseases of woody plants. Dr. Graves.

**E9. Research in Systematic Botany of the Flowering Plants.** Dr. Gundersen.

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* Courses of graduate rank offered by the Botanic Garden, when approved by the Faculty of the Graduate School of New York University, are listed as courses in the Graduate School, and are given the same credit as other graduate courses. Properly qualified students who take these courses may present them in satisfaction of the requirements for advanced degrees given by the University. Graduate credit has also been allowed elsewhere for such advanced work done at the Garden.

## IV. OTHER EDUCATIONAL FEATURES

### Guide Books, Maps, and Souvenir Postcards of the Garden

For those who wish to become acquainted with the various features of the plantations, including the general plan of the systematic section and the nature and location of the various types of special gardens, a guide book is now available entitled "Gardens Within a Garden: a General Guide to the Grounds of the Brooklyn Botanic Garden" (Brooklyn Botanic Garden Record, 17: 153–188. May, 1929.) Copies of this guide have been mailed free to members and are on sale at 25 cents each. Other guides, descriptive of special features, such as the Japanese Garden, will be published shortly.

A detailed map of the Garden, showing not only the various types of gardens included in the Botanic Garden area, but especially the location of the various orders and families in the Systematic Section, is appended to the General Guide. Copies are on sale at 5 cents each.

A colored picture map of the Garden, 7½ x 3½ feet, designed and executed by Miss Helen Sewall, is on view in the Laboratory Building. This map was presented to the Garden at the Annual Spring Inspection, May 14, 1929, as a memorial to the late Dr. Glentworth R. Butler by members of the Woman's Auxiliary and other friends of Dr. Butler. Photographs of this map (in black and white) may be had at 5 cents each.

A set of six souvenir postcards, in colors, may be had at 15 cents a set. The subjects are: Scene in the Children's Garden; The Brook; Daffodils in the Lawn; The Lake; Children's Building and Formal Garden; The Rock Garden (Waterfall and Iris).

**Orders** for guide books, maps, and souvenir postcards, accompanied by remittance, should be sent to *The Secretary*. They may also be obtained at the Information Desk in the Laboratory Building.

### Plantations

The plantations comprise the following sections:

1. General Systematic Section (trees, shrubs, and herbaceous plants arranged according to orders and families).
2. The Local Flora (native wild flower garden).
3. Ecologic Garden.

4. Rock Garden.
5. Japanese Garden.
6. Rose Garden.
7. Iris Garden.
8. Water Garden.
9. Children's Garden.
10. Shakespeare Garden.
11. Horticultural Garden.
12. Experimental Garden.
13. Nursery.

As noted under *Docentry,* arrangements may be made for viewing the plantations under guidance. They are open free to the public daily from 8 a.m. until dusk; on Sundays and holidays from 10 a.m. until dusk.

### Conservatories

The Garden conservatories contain a collection of tender and tropical plants. Of special interest for teachers of nature study and geography are the following useful plants from the tropics and subtropics: banana, orange, lemon, lime, kumquat, tamarind, West Indian cedar (the source of the wood used for cigar boxes), eucalyptus, Manila hemp, sisal, pandanus (source of the fiber used for making certain kinds of fiber hats), fig, grapevines from north and south Africa, date palm, coconut palm, chocolate tree, coffee, tea, ginger, bamboo, mahogany, balsa, cocaine plant, black pepper, annatto (used in coloring butter and cheese), cardamom, olive, pomegranate, logwood, durian, mango, sugar cane, avocado (so-called "alligator pear"), West Indian and other rubber plants, banyan, religious fig of India, and numerous others.

The Conservatories are open April 1 to October 31, 10 a.m.–4:30 p.m. (Sundays, 2–4:30); November 1 to March 31, 10 a.m.–4 p.m. (Sundays 2–4).

### Herbarium

The Garden herbarium consists at present of about 188,300 specimens, including phanerogams, ferns, mosses, liverworts, lichens, parasitic and other fungi, algae, and myxomycetes. This collection may be consulted from 9 a.m. until 5 p.m. by those interested, and specimens submitted will be gladly identified.

## Library

The rapidly growing library of the Garden comprises at present over 14,000 volumes and over 10,000 pamphlets. This is not a circulating library, but is open free for consultation to all persons daily (except Sundays and holidays) from 9 a.m. until 5 p.m. (Saturdays, 9 to 12). Over 900 periodicals and serial publications devoted to botany and closely related subjects are regularly received. These include the transactions of scientific societies from all quarters of the globe, the bulletins, monographs, reports and other publications of various departments of the United States Government, as well as those of foreign governments; of all state agricultural experiment stations and agricultural colleges; the publications of research laboratories, universities, botanic gardens and other scientific institutions of the world, as well as the files of independent journals devoted to the various phases of plant life. The library is especially rich in publications of foreign countries and has a growing collection of incunabula and other pre-Linnean works.

Bibliographical assistance is rendered to readers by members of the Library staff.

## Laboratory Building

The Laboratory Building contains (besides offices of administration and the Library and Herbarium mentioned above) four laboratory rooms, a culture room, three classrooms with stereopticon and other equipment for instruction, a room for the installation of temporary exhibits, six private research rooms, and an auditorium seating about 570 and equipped with motion picture machine, stereopticon and lecture table supplied with water, gas, and electric current for lectures involving experimental work.

## Instructional Greenhouses

A range of three greenhouses, each about 20x30 feet, is provided for the practical instruction of children and adults in plant propagation and other subjects.

## Children's Room

A gift of $1,500 in 1921 from Mrs. Helen Sherman Pratt, supplemented in 1923 by a further gift of $500 from Mr. George D. Pratt, has made it possible to provide a beautifully decorated room for the use of the Boys' and Girls' Club. Any boy or girl who is enrolled, or has been enrolled, in any of the children's classes at the Garden is eligible for membership in this club, which now numbers about 1,000 active members. The room contains shelves for a nature-study library, of which a nucleus has already been secured, and is equipped with stereoscopic views, photographs, and preserved and living specimens of plant life, for the instruction and entertainment of boys and girls. The room is open free to all children. Contributions of specimens and of books on nature study and closely related subjects will be most welcome.

### Children's Garden Building

This is located in the northern part of the Children's Garden plot and contains a conference room, and rooms for the storage of garden tools and implements. The furniture in the conference room was a gift from Mrs. James H. Post. Various collections of plants, seeds, and insects of economic importance in the garden are accessible here for consultation by the children. A garden library, a gift of friends, has been added. North of the Children's Building is a plot planted to ornamental shrubs and herbaceous perennials for the instruction of the children.

### Children's Garden

A plot of about three quarters of an acre in the southeast part of the Botanic Garden is devoted to the theoretical and practical instruction of children in gardening. The larger part of this area is laid out in garden plots which will accommodate about 150 children.

### Rose Garden

The Rose Garden, occupying about one acre in the northwest part of the Botanic Garden, was formally opened to the public on Sunday afternoon, June 24, 1928. This garden was made possible by a gift of $10,000, later increased to $15,000, from Mr. and Mrs. Walter V. Cranford, of Greenwich, Connecticut.

The general plan of the Garden is as follows. At the north end, entrance is gained through a Doric pergola. Three parallel rows of beds extend to the southward from the pergola, as far as the pavilion. In the central row of beds, varieties of hybrid perpetuals have been planted; in each of the two side rows varieties of hybrid teas. In the location of these varieties the older forms appear at the beginning, near the pergola, the most recent productions near the pavilion, with the intermediate forms in chronological sequence between. Varieties of pillar and post roses are planted at regular intervals, on suitable supports, in the beds, with standards between the beds of the side rows. The trellis surrounding the garden as well as the pergola and pavilion furnishes support for climbing roses, while the marginal beds along the trellis are for wild species and their derivatives. South of the pavilion, three additional beds are devoted to historical roses, *i.e.,* those mentioned in ancient literature, and to roses of commercial use.

The Rose Garden is open to the public from 1 to 5 on weekday afternoons, except holidays. Children are admitted only when accompanied by responsible adults.

## Japanese Garden

The Japanese Garden, first opened to the public in 1915, was a gift to the city from Mr. Alfred T. White, "the father of the Botanic Garden." Designed by the Japanese architect, Mr. T. Shiota, it represents truly the Japanese idea of a garden. From the tea house (near the east entrance) one can see the *machiai* or "rest house," the island with the drum bridge, bronze storks, stone and wooden lanterns, the waterfalls, and the wooden Torii standing in the lake. Through this wooden structure the devout Japanese must pass if he is to worship at the Shinto shrine at the top of the hill. "In the Japanese mind, the high hill in the background represents heaven; the lower hill at the right center, man; and the two boulders at the water's edge to the left indicate the region earth. This motive of heaven, man, and earth runs through all Japanese art from landscape gardens to the arrangement of flowers in a vase; so, in walking through the garden, one will notice rocks, steps, stones, trees, stepping-stones, and other objects in threes, in harmony with this same fundamental idea." During the past year this garden has been enclosed by a "woven wood" fence, of chestnut poles, imported from France. This fence was presented by a friend of the Botanic Garden.

# The Brooklyn Institute of Arts and Sciences

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## GENERAL INFORMATION

MEMBERSHIP.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, Brooklyn, N. Y.* Telephone, 6173 Prospect.

THE BOTANIC GARDEN is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays open at 10 a.m.

ENTRANCES.—On Flatbush Avenue, near Empire Boulevard (Malbone Street), and near Mt. Prospect Reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Montgomery Street.

TO ASSIST MEMBERS and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one week in advance. No parties of less than six adults will be conducted.

TO REACH THE GARDEN take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, and Tompkins Avenue trolleys to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street and Vanderbilt Avenue trolleys to Prospect Park Plaza and Union Street.

# PUBLICATIONS OF THE BROOKLYN BOTANIC GARDEN

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly beginning with 1929. Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, announcements of courses of instruction, seed list, guides, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others $1.50 a year, 25 cents a number. Circulates in 41 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Circulates in 47 countries.

Volume I. *Dedication Papers:* comprising 33 scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. 521 pages. Price $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. Price $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor, June 10, 1927. 151 pages. Price $1.60.

CONTRIBUTIONS. Established, April 1, 1911. Papers originally published in periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume. Circulates in 34 countries.

*53. Mutation, adaptation to temperature differences, and geographical distribution in plants.* 12 pages. 1928.

*54. The vegetation of the Allegany State Park.* 121 pages. 1928.

*55. Physiologic races of bunt of wheat.* 14 pages. 1928.

*56. The inheritance of resistance of oat hybrids to loose and covered smut.* 48 pages. 1928.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the *Record;* see above.

*Gardens within a Garden: A general guide to the grounds.* Views and folded map. Published, May, 1929. (Brooklyn Bot. Gard. Record, $18^3$: 153–188.) Price, 25 cents.

SEED LIST. (*Delectus Seminum*) Established, December, 1914. Since 1925 issued each year in the January number of the Record. Circulation includes 143 botanic gardens and institutions located in 42 countries.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in coöperation with the Botanical Society of America, monthly, except during August and September. Subscription, $7.00 a year. Circulates in 48 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the Ecological Society of America. Subscription, $4.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly. Subscription, $6.00 a year. Circulates in 37 countries.

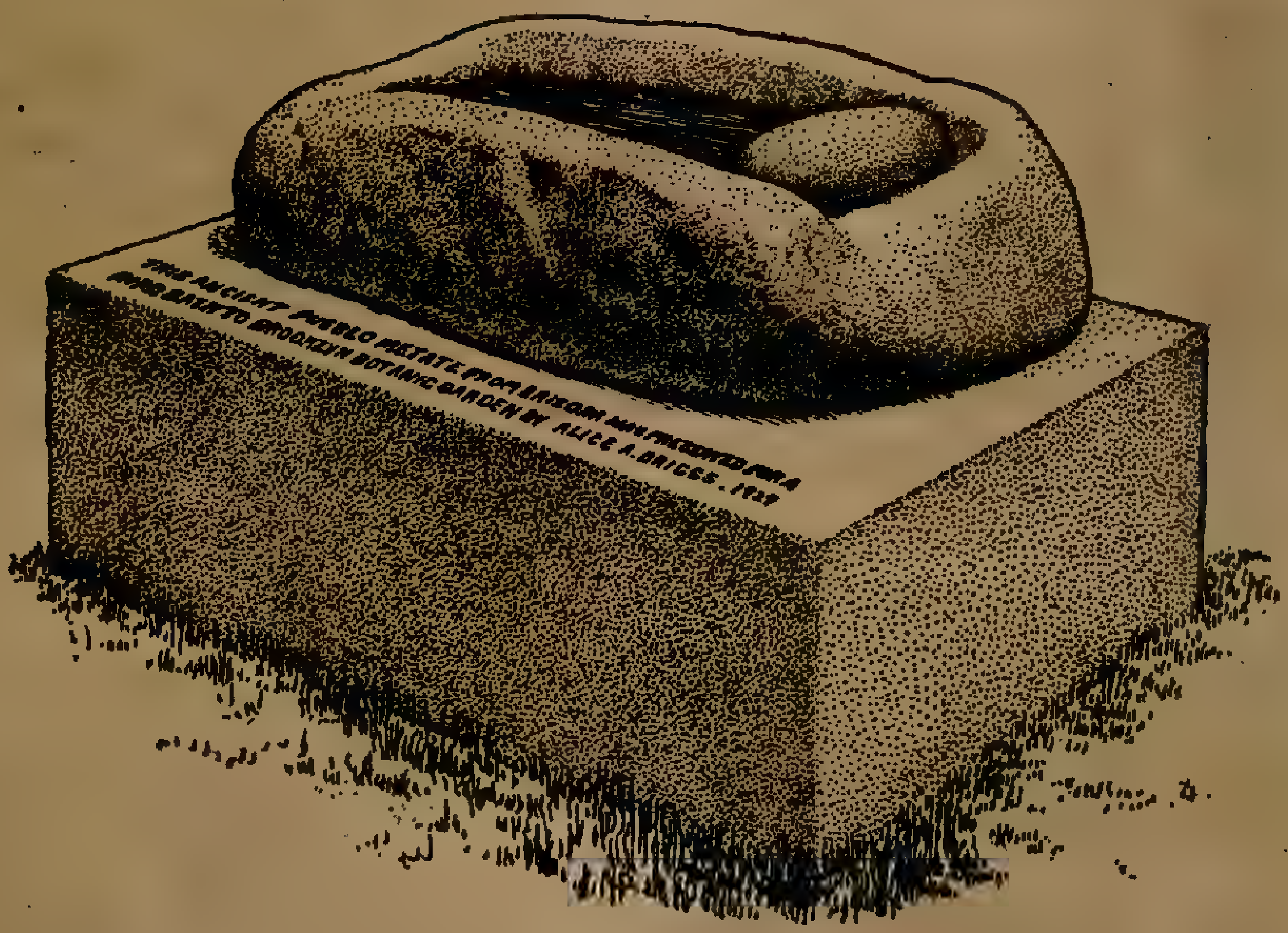
BROOKLYN BOTANIC GARDEN RECORD

VOL. XVIII NOVEMBER, 1929 NO. 6

# THE STORY OF OUR METATE

## A CHRONICLE OF CORN

## GUIDE NO. 3


THIS ANCIENT PUEBLO METATE FROM ARIZONA WAS PRESENTED FOR A
BASE TO BROOKLYN BOTANIC GARDEN BY ALICE A. BRIGGS . 1929

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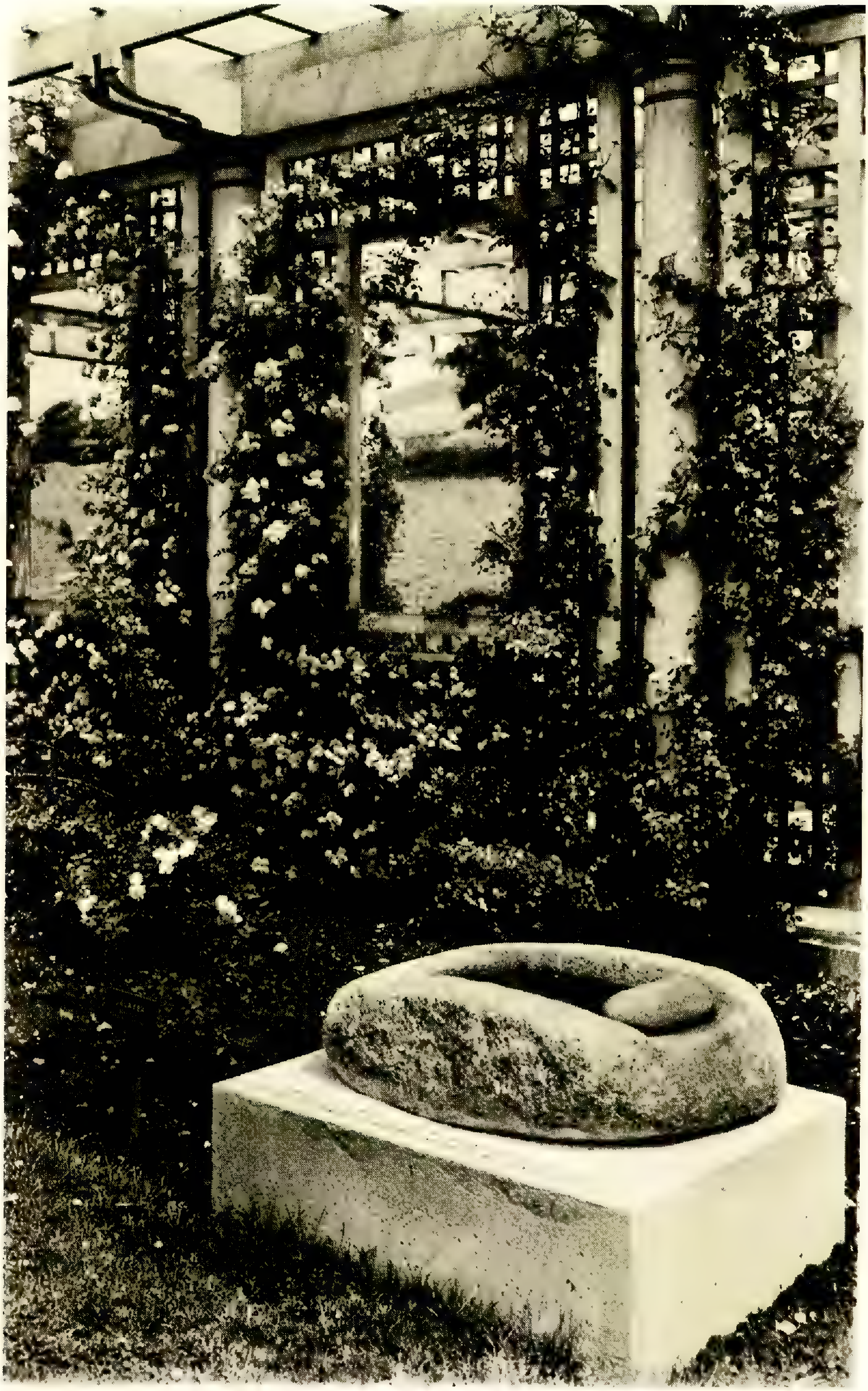

Fig. 1. Ancient Pueblo metate (with hand-stone or *mano*), utilized as a bird bath. Given by Miss Alice A. Driggs in memory of her mother. (6812)

# BROOKLYN BOTANIC GARDEN RECORD

VOL. XVIII NOVEMBER, 1929 NO. 6

## THE STORY OF OUR METATE

## A CHRONICLE OF CORN

BY F. W. HODGE, *Curator,*

*Museum of the American Indian, Heye Foundation*

Metates,* or stone grinding mills, have been among the most important utilitarian objects employed by corn-raising Indians from Central America northward through Mexico into our desert Southwest from the earliest times to the present day. Let us see why this is so.

### What the Indians Have Given Us

First, how many of us pause to think of the wonderful heritage we have received from the American Indians in the way of food products in addition to corn or maize—squash, potatoes, sweet-potatoes, tomatoes, pineapples, cacao (from which chocolate is prepared), peanuts, manioc (the source of cassava and tapioca), the Jerusalem artichoke, cayenne pepper, all of which were cultivated for food by the aborigines centuries before Queen Isabella sold her jewels to enable Columbus to discover a New World. Indeed their gifts have been so great that we may well wonder how the people of Europe subsisted in the days before America and its strange inhabitants became known.

Of all the products of Indian origin, however, maize was and is the most important to them, as it is the most important to agriculture in the United States at the present time. If we may be forgiven for being satistical for a moment, in 1928 the total production of corn in this country alone amounted to 2,839,959,000 bushels, with a farm value of $2,132,991,000, while the value of potatoes and peanuts amounted respectively to more than $280,000,000 and $56,000,000, not to mention the other crops. Indeed more than a third of the value of all the products raised on the farms of the United States was derived from plants that came to us originally from the Red Man. No one therefore can say that a considerable part of the agricultural wealth of the greatest agricultural country of the world has not been directly due to these First Families of America. We adopted, as something entirely new, numerous foods which to the Indians were an old, old story; and we likewise took over bodily many of their methods of preparing foods, as well as the very names by which they were known to them, such as maize itself, hominy, pone, succotash, samp, pemmican, chocolate, tapioca, squash, tomato, and many more that are better known in other parts of the New World, such as aguacate, the Aztec *ahuacatl* (Avocado: *Persea gratissima*), more popularly known as alligator pear. We merely imitate the Indian whenever we extract the oil from sunflower-seeds, or the sap from the sugar-maple and boil it into toothsome syrup or sugar—except that, being less soulful, we do not offer a sacrifice to the spirit of the tree and apologize for robbing it of its life-blood.

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* Pronounced, may-tah′-tays. Aztec, *metatl.*

We need not dwell here on the various useful vegetal products which likewise have been derived from the Indians but which are not used as food, such as cocaine, quinine, stramonium (from the divine *Datura Stramonium*), tobacco, and rubber. For the Indians of tropical and semi-tropical America played ball, with rubber balls, many centuries before our baseball leagues were dreamed of.

## The Origin and Migration of Maize

The botanical origin of Indian corn or maize is unknown. It has not been found growing wild within historic times, but is believed to have originated somewhere between southern Mexico and Bolivia, since that region is the natural habitat of *teosinté* (Fig. 2), a coarse, succulent, annual grass and the nearest wild relative of Indian corn. Collins (*Journal,* Washington Academy of Science, **2**: 520, 1912) thinks it likely that maize originated as a hybrid between teosinté and some unknown and probably extinct species "not unlike the earless varieties of pod corn (*Zea tunicata*)."

This view is rejected by some, and is, of course, to be held only tentatively.

In 1919 Dr. F. H. Knowlton published a description of a fossil ear of maize found in Cuzco, Peru. This specimen afforded the first evidence suggesting the existence of Indian corn in a preceding geological age, hence, if the conclusions are correct, the origin of this important plant must now be sought in remote prehistoric times.

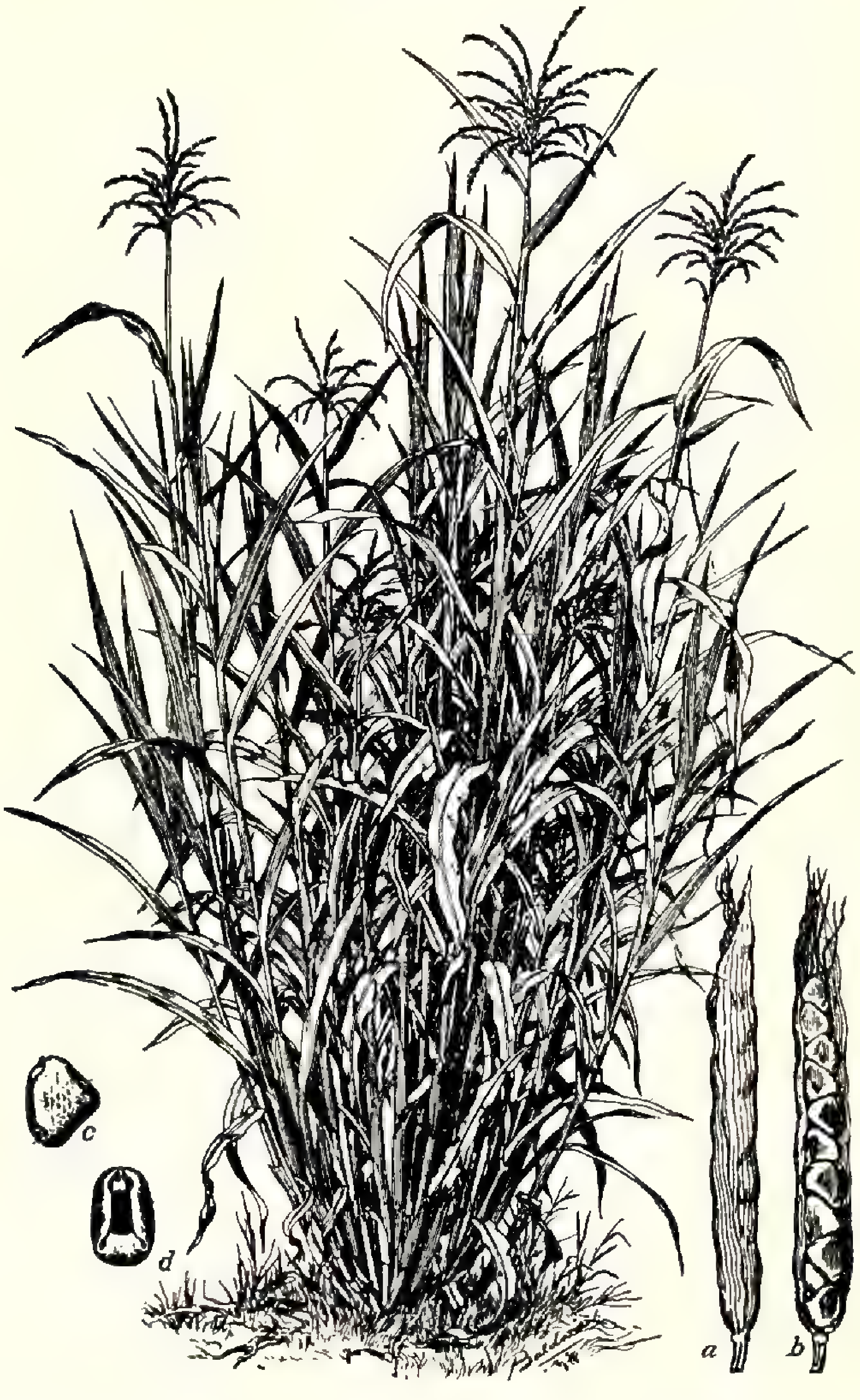

FIG. 2. *Euchlaena mexicana* Schrader (*teosinte;* Aztec, *teocentli*). Considered by some as the possible wild ancestor of Indian corn (*Zea Mays*). After Hitchcock, U. S. D. A. Bulletin No. 772.

Corn was widely cultivated in North and South America before the time of Columbus, and unquestionably for a very long period, for it had already, by that time, developed more varieties and undergone greater improvement than in the period since Columbus. The Maya Indians were among the earliest to cultivate it in the highlands approximately between the Isthmus of Tehuantepec and latitude 22° N.

Archeological investigation in the Pueblo Indian country of our Southwest tends to show that agriculture, by which the cultivation of corn from Mexico is chiefly meant, began somewhere between 2000 and 1500 B.C.

The Aztec form of the word teosinté is teocentli,* from *teotl,* deity, and *centli,* ear of dried corn, a name that to the ancient Mexicans signified its divine origin. The term *maize* is from the Arawak Indian language and was learned by Columbus in the island of Haiti, although in Spain the Peruvian name *zara* was at first used to designate it.

We shall endeavor to picture briefly the conditions in our Southwest at that remote time when corn was introduced and to show what effect on the Indian inhabitants its introduction had.

Up to that early period the Indians did not live in settled communities, but, existing hand-to-mouth by gathering wild seeds, berries, roots, and the like, and eking out their precarious livelihood by capturing small game, they wandered from place to place wherever food could be found. Then came a people more advanced; they lived in rude temporary dwellings constructed of brush, but instead of a bow they used a throwing-stick, or *atlatl,* in hunting, and made excellent basketry but no pottery. It was while these people inhabited the land embraced in what is now northeastern Arizona and south-central and southeastern Utah that corn found its way to the Southwest, and a primitive kind of agriculture was born, with the ultimate result that in time the people found a more strictly sedentary life necessary to their tillage.

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* The form *teocentli* was used by early botanists. The plant now designated by *teosinté* is *Euchlaena mexicana* Schrader (= *Euchlaena luxurians* Durieu & Ascherson). In a letter of October 7, 1929, to the editor, Mr. G. N. Collins, U. S. Department of Agriculture, writes as follows:

> "I am not at all certain that the Mexicans ever applied the name *teocentli* to plants of the genus Euchlaena. The name *teosinté* is now universally used as the common name of Euchlaena species but it is not so used by the natives of Mexico and Guatemala. In these countries *teosinté* or *teocentli* is applied to Tripsacum, a genus of large grasses very distantly related to maize.
>
> "The first application of the name *teosinté* to Euchlaena appears in connection with the introduction of Euchlaena into Europe in 1869, when the records show that Euchlaena seed was sent to France from Guatemala under this name. In view of the fact that Euchlaena has never since been found in Guatemala and that the name *teosinté* is applied to Tripsacum in both Guatemala and Mexico I am inclined to believe that through some error seed of Euchlaena from Mexico became substituted for Tripsacum seed sent from Guatemala. It is a rather discouraging tangle that I hope will some day be unraveled by a careful botanical survey of the Santa Rosa region in Guatemala from which the *teosinté* was sent.
>
> "All this should not be allowed to obscure the fact that Euchlaena, whatever its common name, is the closest known relative of maize and intimately associated with its origin."

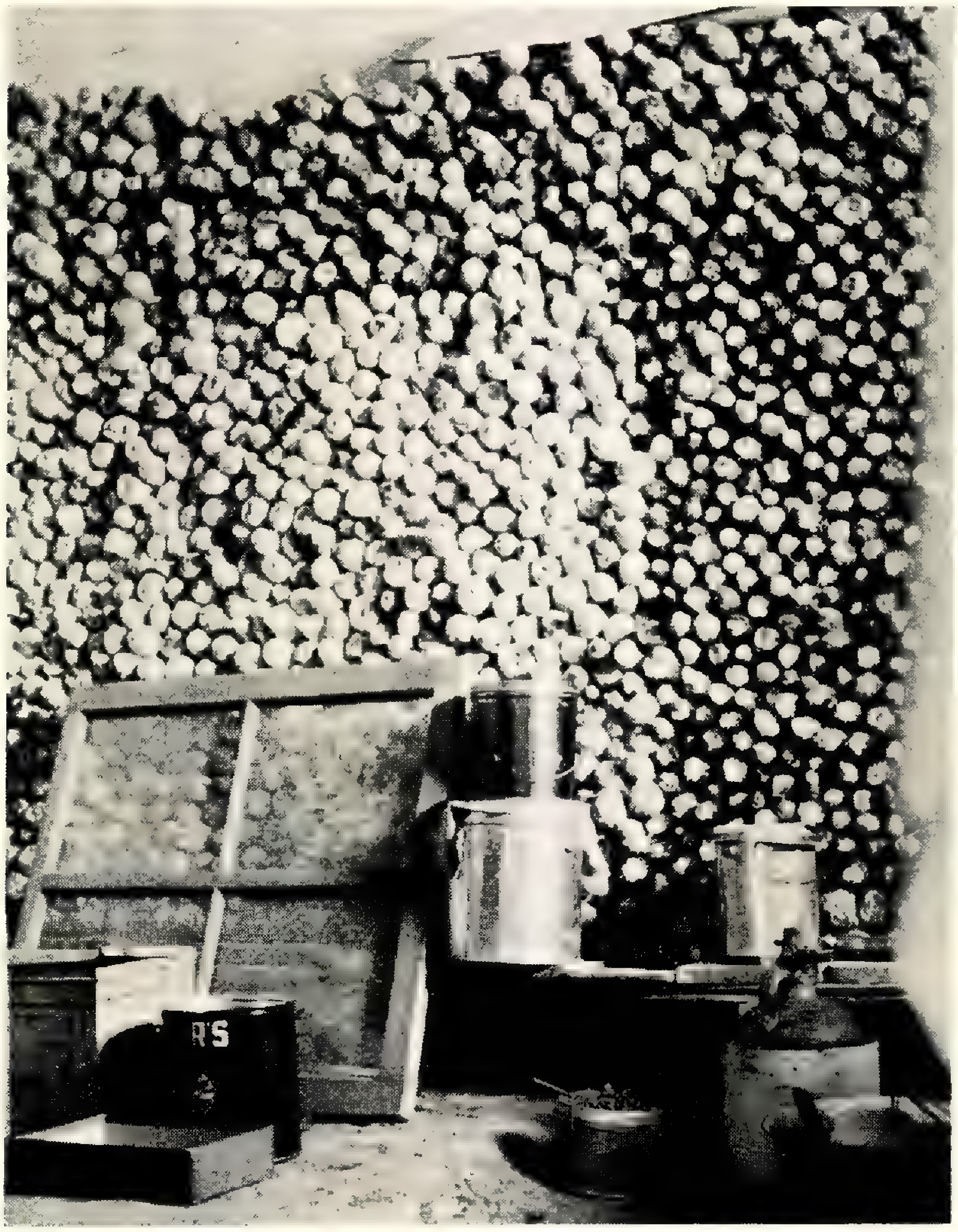
Fig. 3. The corn is husked by the Zuñi Indians and piled in the storeroom for the winter. Photo by Mrs. F. W. Hodge.

This gave rise both to dwellings of a more permanent character and to the need of storage of the crops, meager though they must have been at first (Fig. 3). As the food supply increased, the population was augmented, for people of a roving nature realizing the benison that corn proved to be, settled down to farm life like the others. Later on, rude pottery was invented, houses were of the pit-type; slab-houses with pole-and-brush roofs were perfected and became grouped in villages; the bow gradually superseded the throwing-stick. By this time these "Basket-makers" had spread throughout the San Juan drainage of Utah, Colorado, Arizona, and New Mexico, and to the Little Colorado watershed in Arizona. Progress continued through the generations. The food quest no longer meant such a precarious existence, for Chief Maize had led the way. Later came cotton; dwellings emerged from the ground, became rectangular and were grouped more closely—the Pueblos, as we know them, originated in this way. Remains showing this latest advance are found in parts of the Rio Grande, Little Colorado, and upper Gila rivers, and recent investigation indicates that it extended into western Texas (Fig. 4). The people branched out more and more as the centuries rolled on, and the women found time to decorate their pottery in black-and-white and in beautiful corrugated patterns. Then there was greater concentration of population in certain areas, greater architectural and ceramic achievement.

Let this suffice to show the influence of corn on a lowly people from the time of its introduction until the Spaniards made their appearance in the Southwest near the middle of the 16th century. Before they knew corn they were probably not unlike the Indians of the Nevada deserts, existing on anything they found edible, huddling from winter gales beneath brush structures unworthy the name of dwellings, producing little or nothing in the way of art. But the Basket-makers, once familiar with corn, were augmented by newcomers until in course of time a true Pueblo culture was developed, characterized by elaborate rites, ceremonies, religious and fraternal organizations, a mythology of high ingenuity, agriculture with irrigation requiring engineering skill, houses and ceremonial chambers sometimes of daring construction, and a social system of marvelous intricacy and tribal beneficence. All

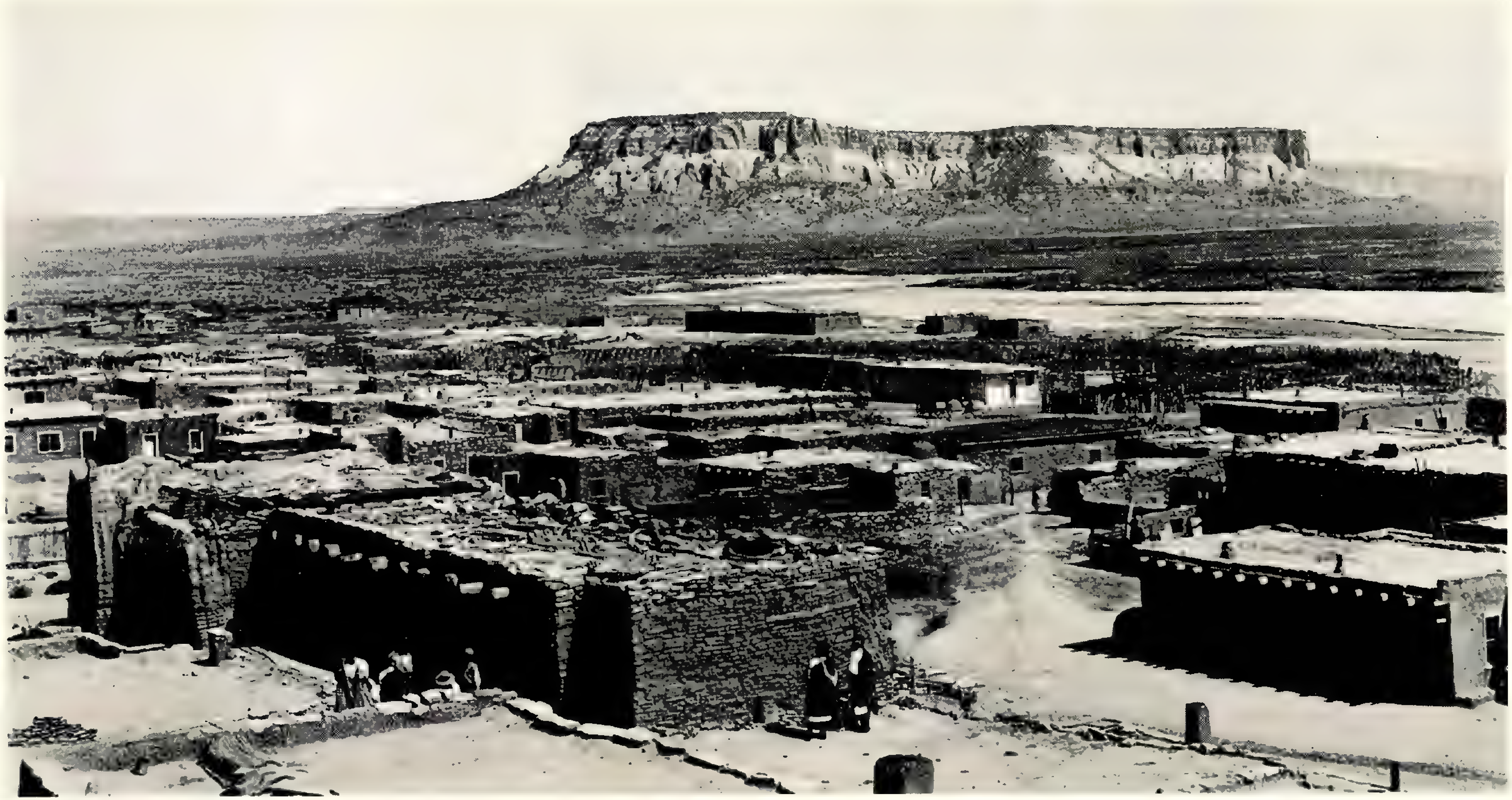

FIG. 4. Looking from the housetops of Zuñi pueblo southeastward to the sacred "Corn Mountain," Towayalane. Photo by E. F. Coffin. (Courtesy of the Museum of the American Indian, Heye Foundation.)

this is what corn made possible to the most highly advanced Indians within our domain.

At what period corn spread to other parts of the country from the Southwest, or from Florida by way of the West Indies, we do not know, but doubtless its rate of travel was rapid. The more interesting point, perhaps, is what excellent farmers the Indians were to so successfully adapt an exotic plant, that had its origin in the highlands of a hot country, to the soil, climate, and altitude in which they chanced to live, by methods of cultivation which of necessity they devised (Fig. 5). It is indeed a far cry from its place of origin to the great prairies of our Midwest, to New England and lower Canada with their rigorous winter climate, and the desert sands of our vast Southwest.

Yet wherever maize became known, there it was successfully cultivated by the skilful farmers of the Red Race. Strangely enough, the Indians of California, although well advanced in other directions, did not cultivate corn or anything else, but depended for their subsistence on the products of the rivers and sea, or on such wild stores as their habitat provided, not even disdaining insects and larvae. In other localities where in ancient times subsistence was gained from a none too prodigal Nature, the culture of the tribes was probably not unlike that of the California Indians when first known to the whites. Then maize was introduced, and, behold, a new era dawned! Agriculture largely superseded the gathering of wild products, vegetal and animal; dwellings more or less permanent were grouped in defensive villages, for to wilder tribes who preferred to follow the lives of huntsmen and raiders it became easy to make forays against their weaker neighbors and loot the hard-earned product of their toil. Therefore corn played an important part not alone in changing the mode of life of sedentary peoples, but it afforded the chief incentive of stronger tribes to carry on their depredations.

## Quantities of Corn

Owing to the varying conditions under which maize was cultivated, several varieties were developed, four being mentioned in Virginia alone in Colonial times. Jacques Cartier saw large fields of corn about the site of Montreal in 1534, and six years later

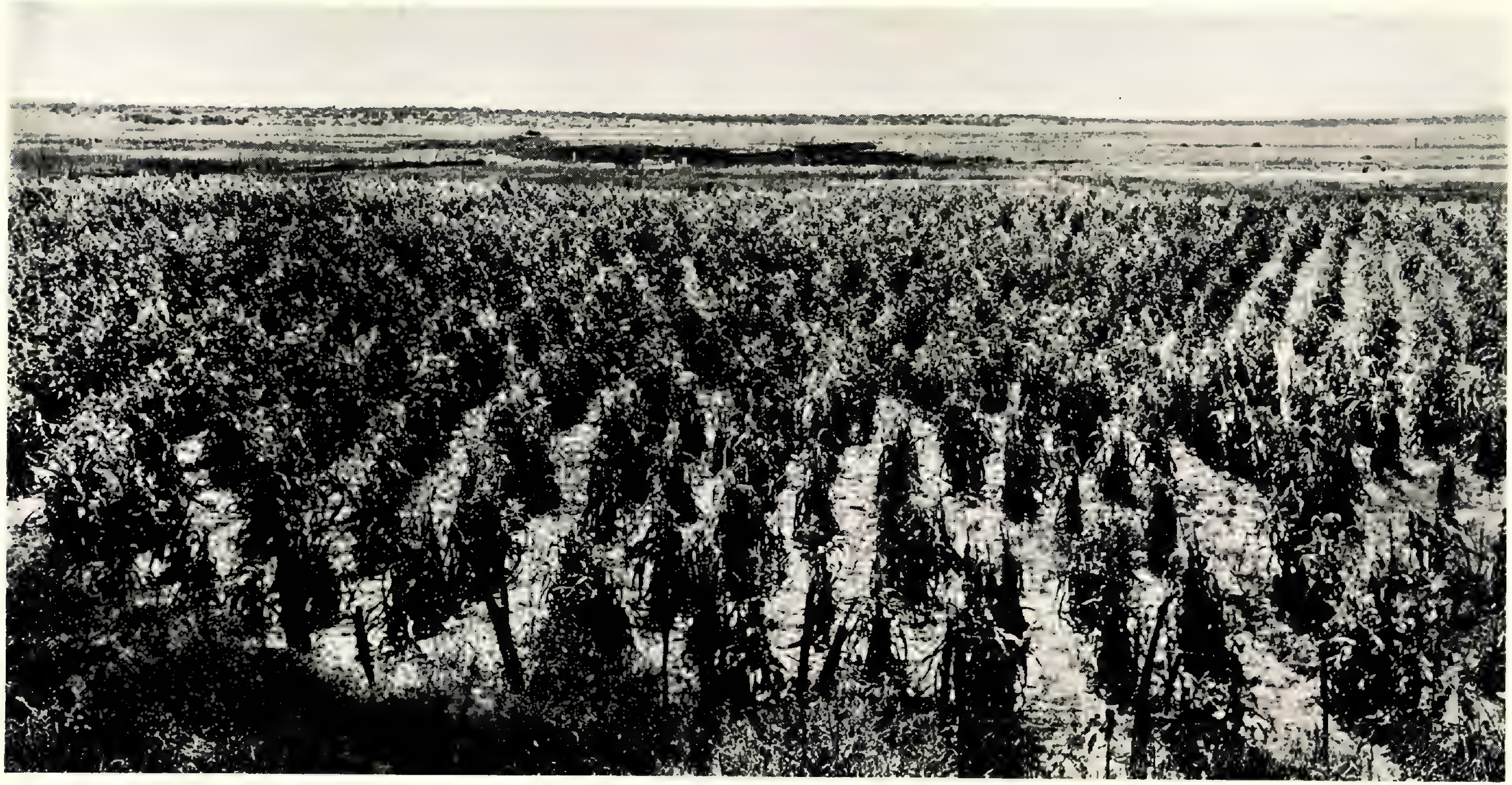

FIG. 5. A typical Zuñi cornfield, New Mexico. Note how the corn grows in clusters widely separated for the purpose of insuring adequate water supply for each plant. This is an example of dry farming in sand. (Photo by Jesse L. Nusbaum. Courtesy of the Museum of the American Indian, Heye Foundation.)

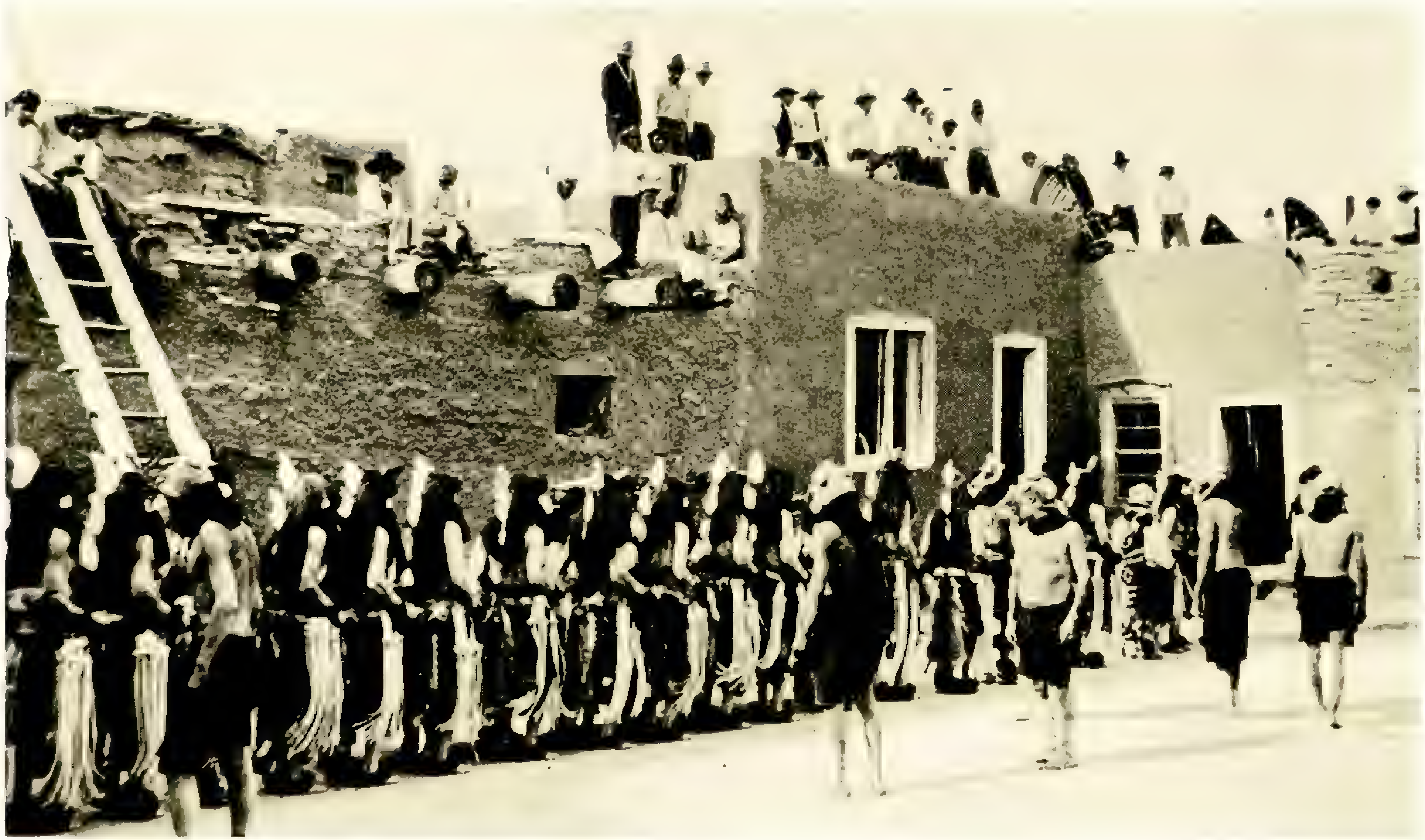

Fig. 6. A rain dance at Zuñi in 1923. The row of participants wear masks representing sacred personages. The individuals with grotesque knobbed masks and black loin-cloths are the Koyemashi, or sacred clowns. Photo by Mrs. F. W. Hodge.

Coronado and members of his famous expedition found it grown in abundance by irrigation in New Mexico and Arizona. Many early explorers, French, Spanish, English, and Dutch, from Canada to the Gulf of Mexico and from the Atlantic coast to the Colorado River of the West, everywhere noted the cultivation of corn, and some of them marveled at the prodigious quantities. It has been said that the amount of corn of the Iroquois destroyed by Denonville in 1687 aggregated a million bushels and that it required seven days for the army to cut up the harvest of only four villages. Other early writings on the Indians are replete with descriptions of vast cornfields everywhere.

## The Corn Cult

The tribes of the prairies, which subsisted largely by hunting, necessarily led an existence not conducive to sedentary life; they remained nomads, following the bison throughout a range of hundreds of miles and using the product of its carcass for every imaginable need. Yet even some of these tribes raised corn to some extent, following the chase after the crop was garnered and stored for winter use. All Indians hunted game to a greater or lesser extent; but corn became the great staple of the village-dwellers. Indeed so dependent on it were they that they developed what may be called a corn cult, with various sacred personages embodying the corn principle, such as Mother Corn and Mother Earth; and many rites and ceremonies were performed and sacrifices made for the increase of the life-preserving grain. One of the most prominent deities of the Aztecs was *Centeotl,* who seemed to embody both the male and the female principle as symbolized by corn. In Peru the importance of corn was so fully appreciated that it was regarded with reverence and used as a sacred plant in many religious rites and ceremonies.

Nowhere in the United States did corn enter more deeply into the culture of the Indians than in the arid land of the Pueblo tribes of the Southwest, where existence has ever been a struggle. To these people corn was the most important thing in the world; hence the desire for rain, by which cultivation was and is alone possible whether by irrigation or socalled dry-farming, is the very foundation of many of their prayers and ceremonies, and of an

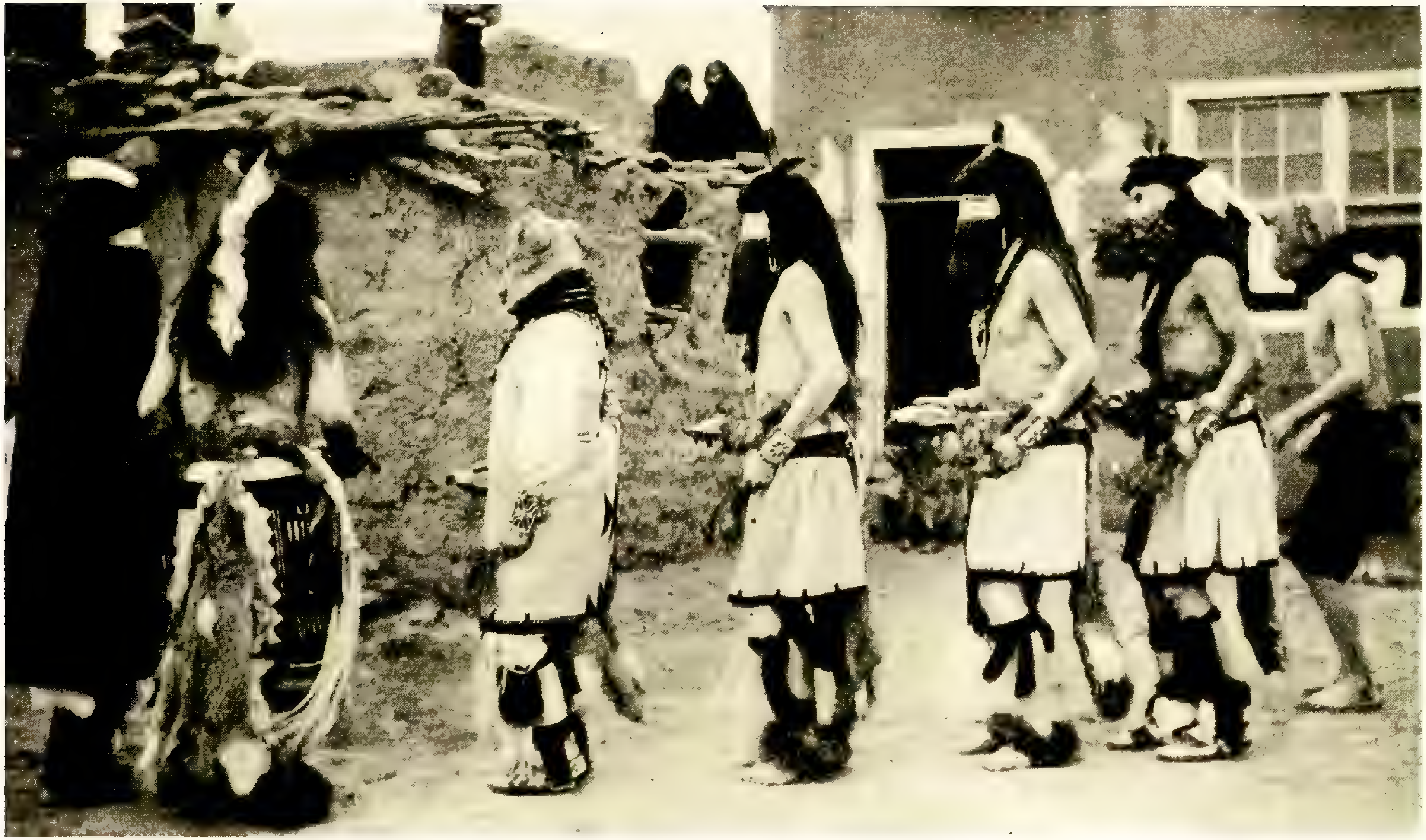

Fig. 7. Some of the priestly participants in a Zuñi rain dance. Photo by Mrs. F. W. Hodge.

elaborate symbolism. The downy feathers of the soaring eagle attached to prayer-sticks are potent invocations for rain; the sinuous rattlesnake is symbolic of lightning; every living thing that derives its sustenance directly or indirectly from the waters —tadpoles, frogs, fish, turtles, the dragon-fly, and every vegetal growth found about springs—all are sacred because water-producing. "Without water there is no corn; without corn we die." Little wonder then that maize, the veritable staff of life, so dependent on moisture for the very existence of the Pueblo farmer and his family, should be symbolized by the Corn Maidens of their mythology and by many other personages, or that they should treasure the sacred ornaments and other devices which appear in the beautiful rhythmic Rain dances that in summer are performed day after day with accompanying songs and drum-beat for a week or more at a time (Figs. 6 and 7). It is not difficult to see, then, what influence the cultivation of corn wielded in the economic life of such a people, how it affected their religion and mythology, and even their social organization as shown by numerous clans which take their names from maize. They have adapted its cultivation to their environment, overpowering the arid sands with irrigation by means of canals fed sometimes from distant streams. In the case of dry-farming in favorable spots they plant a handful of kernels in a deep hole made with a wooden dibble, that the plants may find moisture and protect one another from the hot desert blasts. In Zuñi philosophy corn is given a most prominent place in the native beliefs. Cushing recorded these words of a native priest:

"Five things alone are necessary to the sustenance and comfort of the Indians among the children of earth—The Sun, who is the father of all; the Earth, who is the mother of men; the Water, who is the grandfather; the Fire, who is the grandmother; our brothers and sisters the Corn, and seeds of growing things."

So long ago was it that corn first became known to the Indians of this country that its origin, lost in the mists of antiquity, is accounted for only through mythology, and many and beautiful are the stories that reveal to these simple folk the manner in which this food of foods came to them. Let us tell briefly one of the mythic tales which the Zuñis of New Mexico have handed down by word of mouth through the ages, as recorded by Cushing:

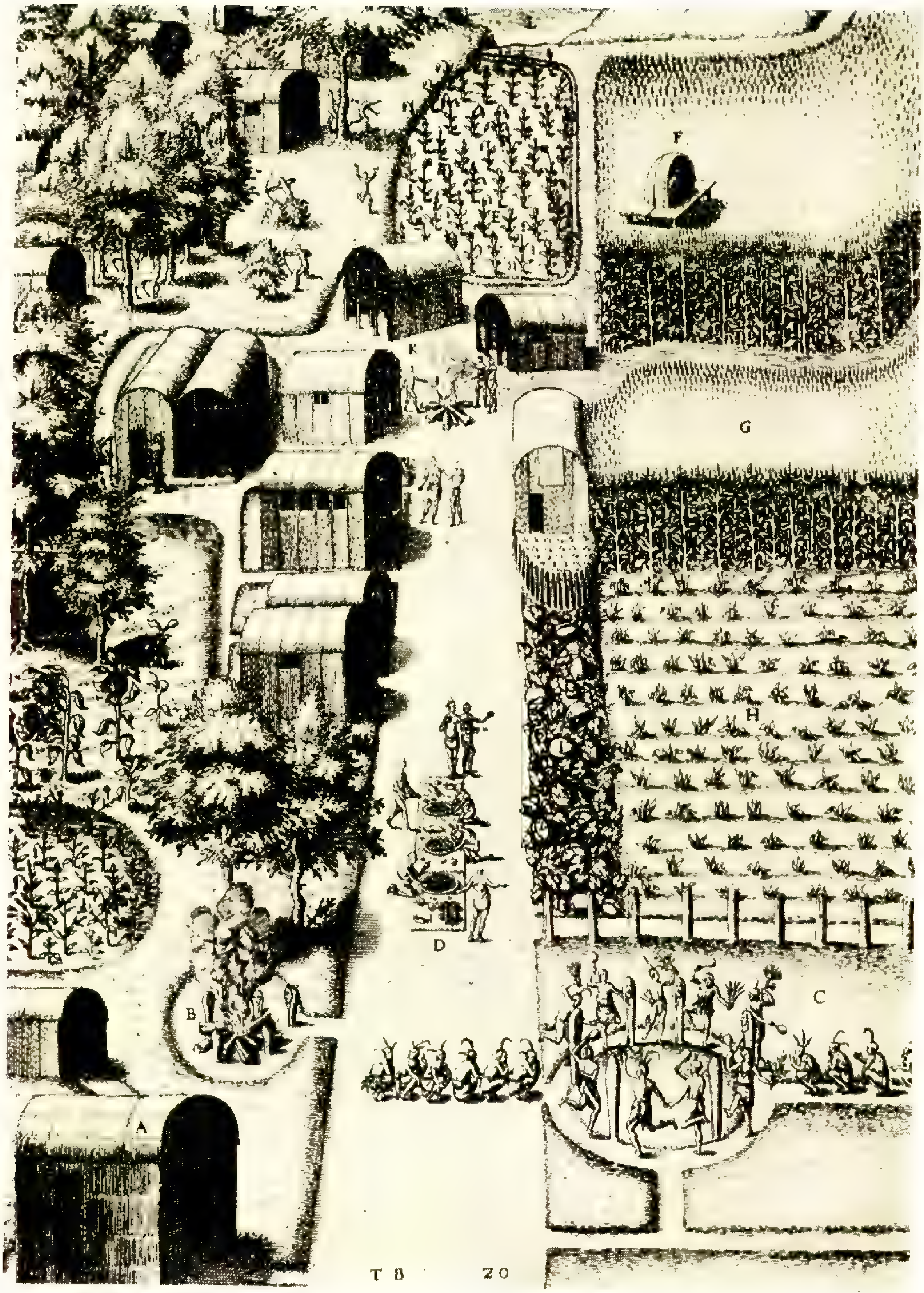

Fig. 8. The village of Secotan on Pamlico river, North Carolina, in the latter part of the 16th century. After the drawing by John White in Thomas Hariot's "A Briefe and True Report of the New Found Land of Virginia," 1590. (The letters in the drawing are referred to in the quotation in the text.)

Marvelous both of good and evil were the works of the ancients. Alas! there came forth with others, those impregnated with the seed of sorcery. Their evil works caused discord among men, and, through fear and anger, men were divided from one another. Born before our ancients, had been other men, and these our fathers sometimes overtook and looked not peacefully upon them, but challenged them—though were they not their elder brothers? It thus happened when our ancients came to their fourth resting place on their eastward journey, that which they named "Place of Misty Waters," there already dwelt a clan of people called the Seed people, and the Seed clan of our ancients challenged them to know by what right they assumed the name and attributes of their own clan. "Behold!" said these stranger beings, "we have power with the gods above yours, yet can we not exert it without your aid. Try, therefore, your own power first, then we will show you ours." At last, after much wrangling, the Seed clan agreed to this, and set apart eight days for prayer and sacred labors. First they worked together cutting sticks, to which they bound the plumes of summer birds which fly in the clouds or sail over the waters. "Therefore," thought our fathers, "why should not their plumes waft our beseechings to the waters and clouds?" These plumes, with prayers and offerings, they planted in the valleys, and there also they placed their medicine seed of corn. Lo! for eight days and nights it rained, and there were thick mists; and the waters from the mountains poured down, bringing new soil and spreading it over the valleys where the plumed sticks had been planted. "See!" said the fathers of the Seed clan, "Water and new earth bring we by our supplications."

"It is well," replied the strangers, "yet *life* ye did not bring. Behold!" and they too set apart eight days, during which they danced and sang a beautiful dance and prayer song, and at the end of that time they took the people of the Seed clan to the valleys. Behold, indeed! Where the plumes had been planted and the medicine seed of corn placed grew seven corn-plants, their tassels waving in the wind, their stalks laden with ripened grain. "These," said the strangers, "are the severed flesh of seven maidens, our own sisters and children. The eldest sister's is the yellow corn; the next, the blue; the next, the red; the next, the white; the next, the speckled; the next, the black, and the last and youngest is the sweet-corn, for see! even ripe, she is soft like the young of the others. The first is of the Northland, yellow like the light of winter; the second is of the West, blue like the great world of waters; the third is of the South, red like the Land of Everlasting Summer; the fourth is of the East, white like the land whence the sun brings the daylight; the fifth is of the upper regions, many-colored as are the clouds of morning and evening, and the sixth is of the lower regions, black as are the caves whence came we, your elder, and ye, our younger brothers."

A beautiful dance, with the Corn Maidens costumed and wearing an elaborate colored headdress, and bearing decorated ears of corn in each hand, is still performed by the Zuñis.

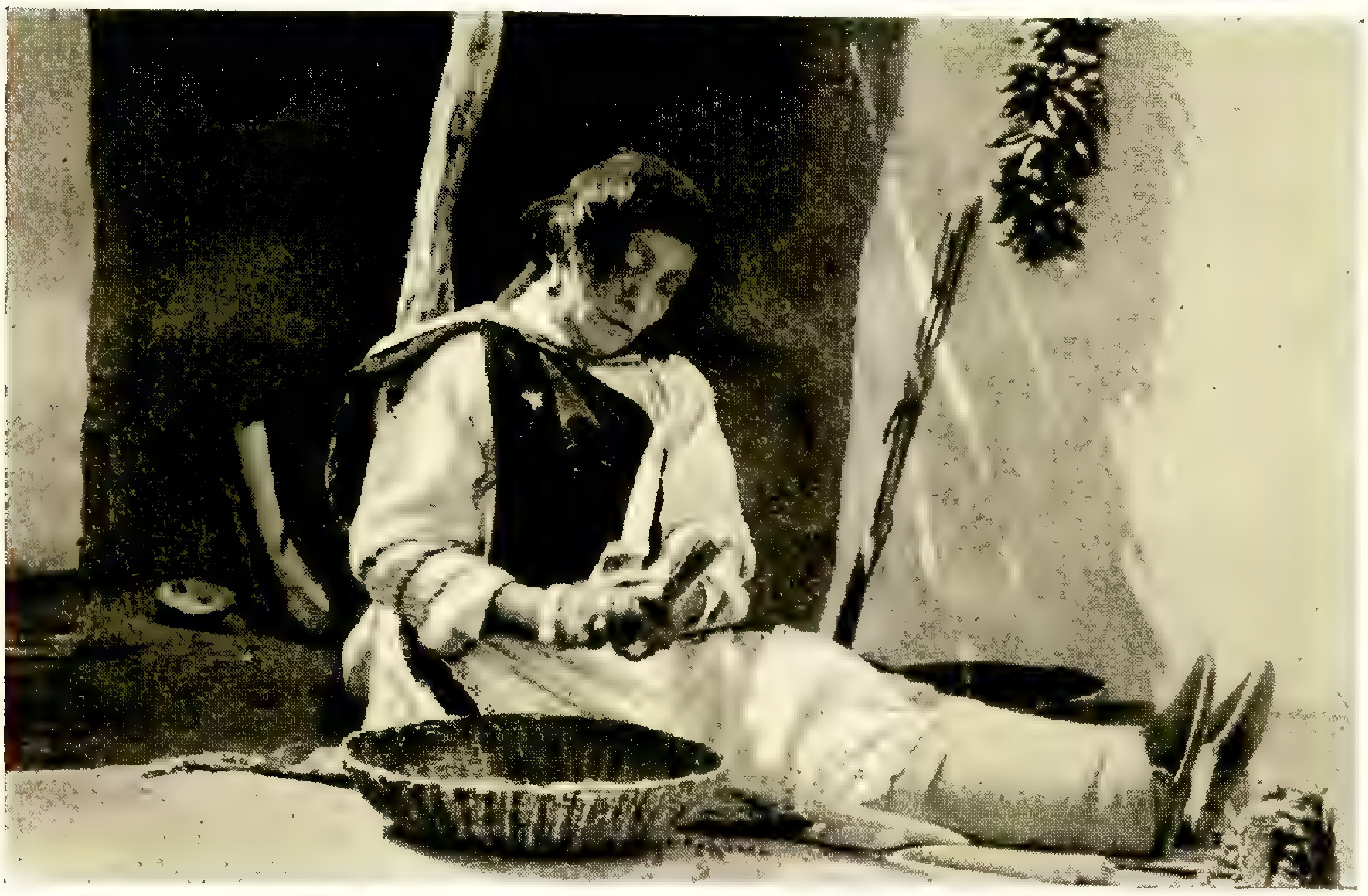

FIG. 9. A Zuñi woman in typical costume shelling corn with a cob into a basket tray. Photograph by Donald A. Cadzow.

The cult of the corn was found also among tribes that hunted much of the time, although they lived in permanent villages composed of substantial earth-lodges. Such were the Pawnee and the Omaha Indians of Nebraska, and the Arikara of North Dakota, for example, among whom corn was so important that elaborate ceremonies were performed in its honor and glory. It is doubtful if any Indians who cultivated maize did not practise rites for its successful growth, or who did not recount many myths and folk-tales or sing songs relating to the Corn Mother or her counterpart. We cannot enter deeply into the subject here; indeed it would require a very large volume to tell the story of corn in its relation to the Indians, and then perhaps the half would not be told. But we must indulge ourselves a moment to summarize the religious regard in which corn was held by the Pawnee, whose homeland was the Platte river valley, but who hunted bison on the great plains and often warred with other tribes. This concept, so replete with symbolism, was recorded by the late Alice C. Fletcher.

In a certain rite an ear of white corn, known as "Mother," was used. This ear was representative of the fruitfulness of the earth. Its tip was painted blue to symbolize the dome of the sky, the dwelling-place of the Powers, and four equidistant blue lines extending halfway down the ear were the paths along which the Powers descended to minister to man. Attached to the ear was a downy white eagle-feather which typified primarily the high white clouds that float near the dome of the sky where the Powers dwell, thus indicating their presence with the corn. The corn was regarded by the Pawnee, as by other tribes, as the female principle, and the feather as the male principle. The ear of corn therefore represented the supernatural power that dwells in the earth which brings forth the food that sustains life, hence its real and literal

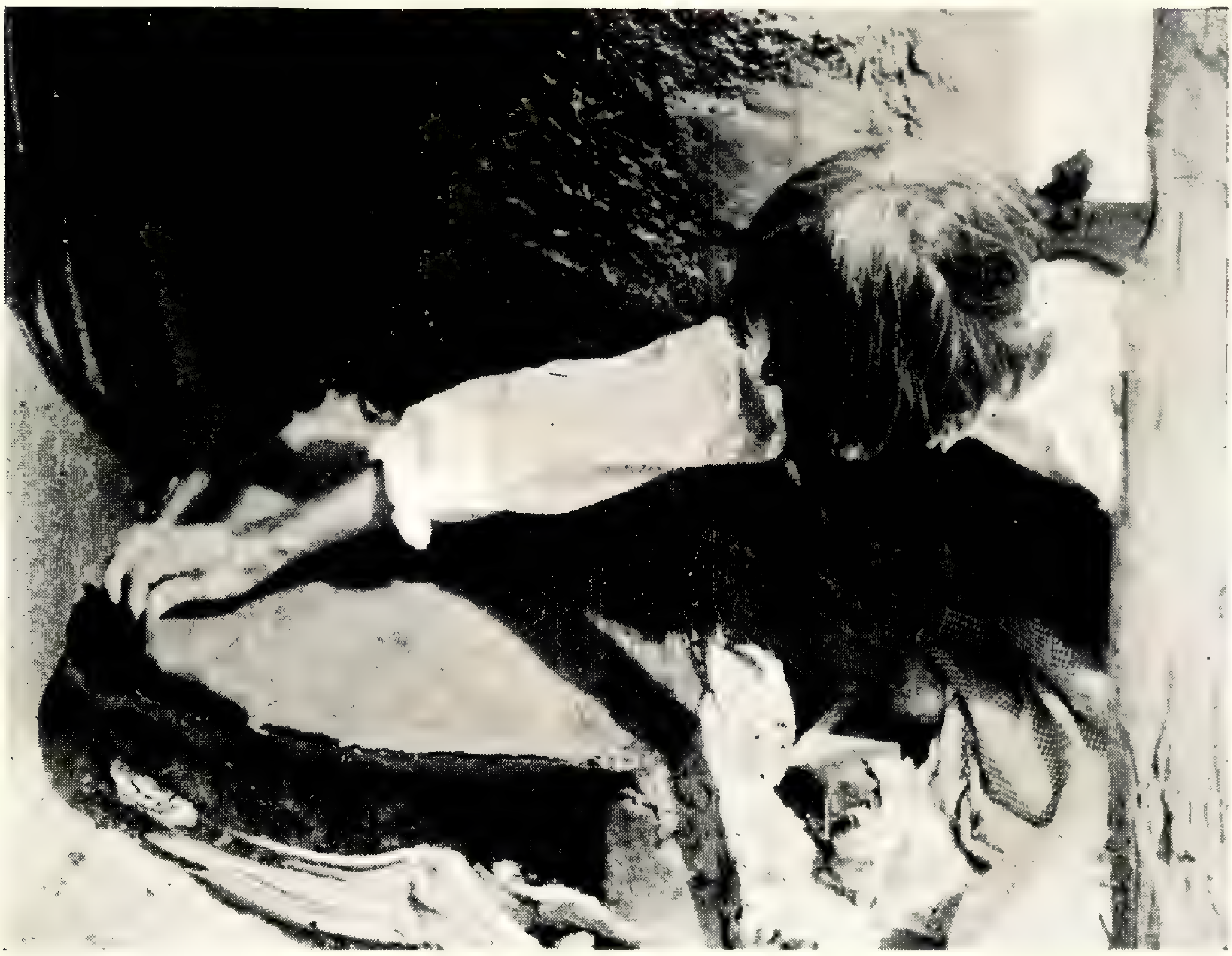

FIG. 10. A Zuñi woman peeling "paper bread," made of corn, from a stone slab beneath which a fire is built. This bread was referred to by the Spaniard, Castañeda, in 1540. Courtesy of the Museum of the American Indian, Heye Foundation.

significance is "Mother Breathing Forth Life." The deep reverence in which Mother Corn is held by the Pawnee may best be expressed in their own words:

> "Mother Corn, breathing forth life, came from Mother Earth, who knows all places and all that happens among men, so she knows all places and all men, and can direct us where to go when we carry the sacred articles which give plenty and peace."

The Pawnee have a sacred feast of corn: When all the company have been seated the fathers ladle out the food into the bowls. The priest takes up a little of the food on the tip of a spoon, offers it toward the east, flipping a particle toward the horizon line. He then passes to the north, drops a bit on the rim of the fireplace, and goes to the west, where, facing the east, he lifts the spoon toward the zenith, pauses, waves it to the four quarters and slowly lowers it to the earth and drops a bit on the rim of the fireplace. After this ceremony of offering thanks the filled bowls are placed before the people. Two or more persons take a few spoonsful from the same bowl, then, hanging the spoons on its edge, they pass the bowl on to the next group at the left. In this way all the people partake of a common feast.

## Cultivation and Harvest

Among the Zuñis, after planting, every man, woman, and child of the tribe deposits in the family field a feathered prayer-stick and offers a prayer to the Rain Gods that the crop may be abundant. During the period of growth the plants are tended with religious care that weeds may not choke them, nor crows nor stray donkeys inflict their ravages. Harvest time comes, and again men, women, and children garner the priceless crop. No, it is not a "golden harvest," for Pueblo maize is of every imaginable hue. The Pueblo housewife justly regards her store of corn as the most beautiful, colorful thing in the world.

A quaint description of a Virginia Indian cornfield was written by Thomas Hariot (who was appointed geographer by Sir Walter Raleigh to his second Virginia expedition) to describe a drawing by John White which appears in Hariot's report published in 1588 and which we reproduce here (Fig. 8).

In their corne fields they builde as yt weare a scaffolde wher on they sett a cottage like to a rownde chaire, signiffied by *F.* wherein they place one to watche, for there are suche nomber of fowles, and beasts, that vnless they keepe the better watche, they would soone deuoure all their corne. For which cause the watchman maketh continual crys and noise. They sowe their corne with a certaine distance noted by *H.* other wise one stalke would choke the growthe of another and the corne would not come vnto his rypeurs *G.* For the leaves thereof are large, like vnto the leaues of great reedes . . . Likewise they haue garden notted bey the letter *I,* wherein they vse to sowe pompions [pumpkins].

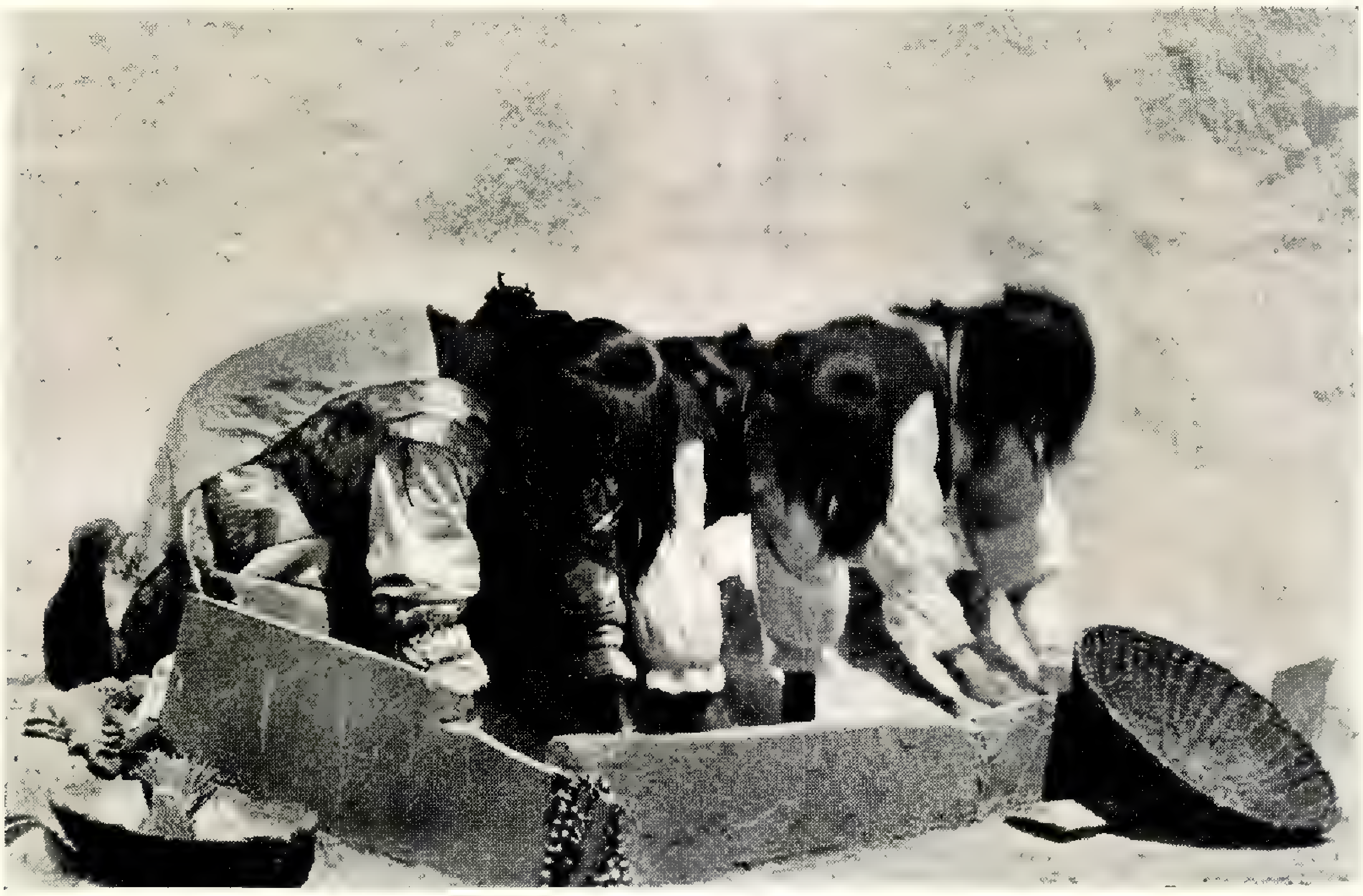

Fig. 11. Zuñis grinding corn on the stone metates. Note the grass brush in the basket at the left, used to brush the meal from the grinding stones. (Cf. Fig. 12.) Photo by Donald A. Cadzow.

## Women's Rights

As we have hinted, the corn, once gathered, becomes the property of the woman of the Pueblo family. Her husband may have done the planting and the tilling, he may have deposited many prayer-sticks, offered numerous prayers, participated in many dances, including a ceremony of thanksgiving for an abundant crop; but here his duty and his direct interest end. He has no more property-right in the corn stored in the home than he has in the children or in the house in which he lives. They all belong to his wife; there's no mistake about it! The Pueblo women had their "rights" long before civilization knew of a New World.

This being the case, it may reasonably be assumed that the woman prepares the food. She does. A Pueblo man would not think of having anything to do with the preparation, nor with anything pertaining to it. It is strictly women's work. The woman grinds the corn and cooks it in a score of different ways; she fashions and fires the pottery vessels in which it is cooked, and she builds the oven in which it may be baked (Figs. 9–13).

## The Metate

"But surely the man makes the heavy metate from a large boulder, and the hand-stone or mano with which the grinding is done?" you ask.

Not by any means. That is a part of women's work as well, for is it not concerned directly with the preparation of food? For the purpose her husband may bring from the hills a stone or

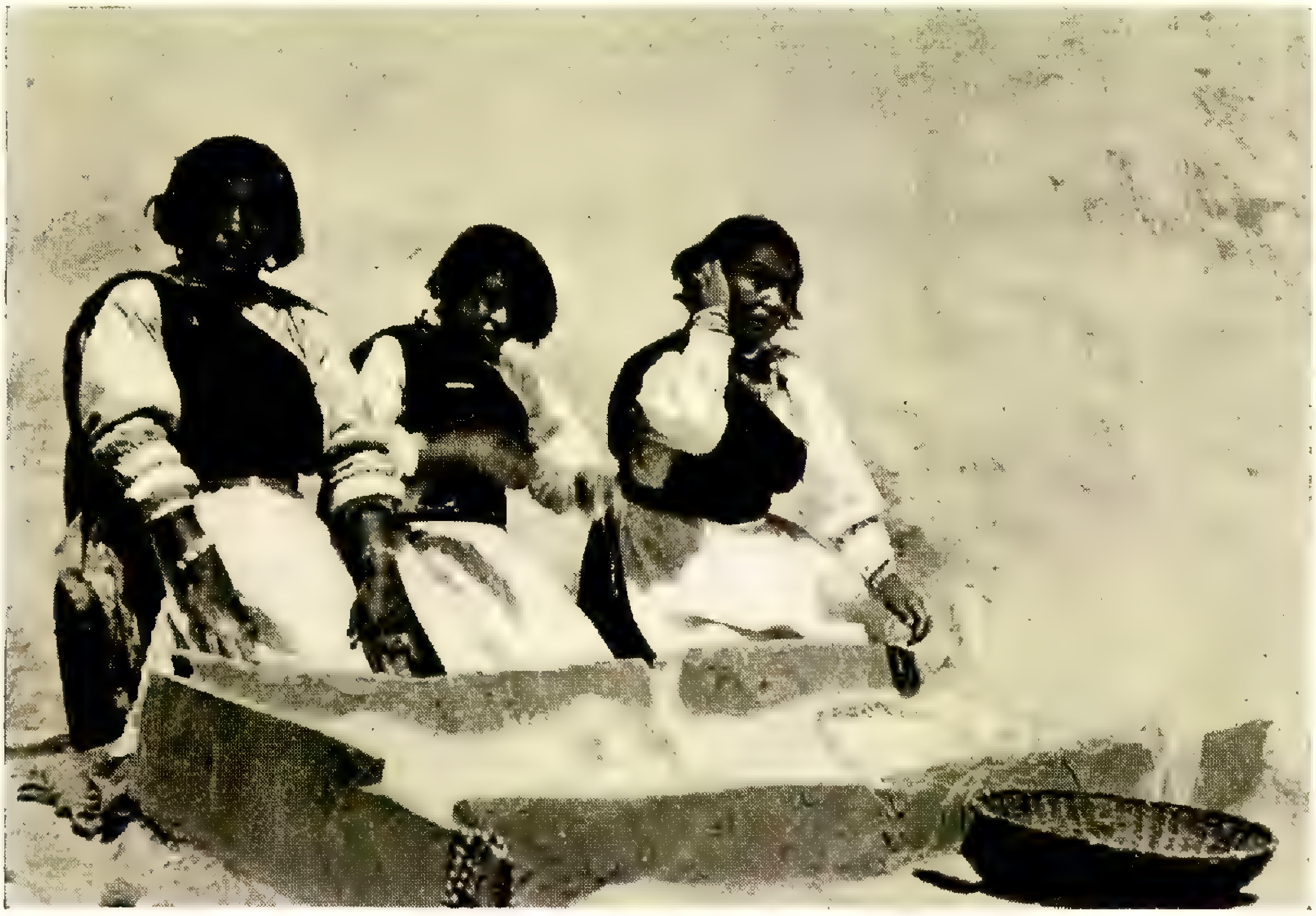

FIG. 12. Zuñi women grinding corn. (Cf. Fig. 11.) Photo by Donald A. Cadzow.

several stones of the desired quality, but his wife will do all the shaping by laboriously pecking away with a small boulder of harder stone until it is of the prescribed form. The work devoted to a single metate, such as the one in the Botanic Garden (Fig. 1), may require weeks of time.

Usually three stones are required—one, of coarse grain, often of hard porous lava, for hulling the corn; another, of finer stone, for milling it coarsely, and the third, usually of fine-grained sandstone, for grinding it until it is almost flour-like. These metates are set side by side, the end toward the grinder higher than the other end, in a kind of low trough built in the floor, with partitions of wood or stone separating them to keep the ground corn within its proper confines. The women kneel on the floor before the trough, their feet usually braced against the house wall, and each with her mano or grinding slab (which is coarse or fine to correspond with the metate) grinds up and down, up and down, often from dawn until dark (Figs. 11 and 12). Coronado, the explorer, wrote of these Zuñi corn-grinders in 1540: "They have the very best machinery for grinding that was ever seen. One of these Indian women here will grind as much as four of the Mexicans." The labor is arduous, but these gentle, happy, patient little women have a way of lessening it by crooning a charming little grinding song, such as the following one of Zuñi recorded by Natalie Curtis:

Yonder, yonder see the fair rainbow,
See the rainbow brightly decked and painted!
Now the swallow bringeth glad news to your corn,
Singing, "Hitherward, hitherward, hitherward, rain,
  "Hither come!"
Singing, "Hitherward, hitherward, hitherward, white cloud,
  "Hither come!
Now hear the corn-plants murmur,
"We are growing everywhere!"
Hi, yai! The world, how fair!

Or the following quaint ditty from Laguna pueblo, New Mexico:

  Butterflies, butterflies,
Now fly away to the blossoms,
  Fly, blue-wing,
  Fly, yellow-wing,

Now fly away to the blossoms,
  Fly, red-wing,
  Fly, white-wing,
Now fly away to the blossoms,
  Butterflies, away!
  Butterflies, butterflies,
Now fly away to the blossoms,
  Butterflies, away!

If a woman should chance to have much grinding for her household, which usually is the case, and her immediate female relations are not available, she will call on her neighbors to aid in the task; and they in turn will invite her to their grinding bee whenever they are hard-pressed.

In all probability there has been little change in the method of grinding by the Zuñi women for a thousand years or longer. Recording observations which he made on the spot, Castañeda, the principal chronicler of Coronado's expedition of 1540, wrote as follows, his quaint description being quite applicable to the custom today, except for the flute-playing swain, although the men do have corn-grinding songs which they sometimes sing to the girls while engaged in milling:

> They keep the separate houses where they prepare the food for eating and where they grind the meal, very clean. This is a separate room or closet, where they have a trough with three stones fixed in stiff clay. Three women go in here, each one having a stone, with which one of them breaks the corn, the next grinds it, and the third grinds it again. They take off their shoes, do up their hair, shake their clothes, and cover their heads before they enter the door. A man sits at the door playing on a fife while they grind, moving the stones to the music and singing together. They grind a large quantity at one time, because they make all their bread of meal soaked in warm water, like wafers. They gather a great quantity of brushwood and dry it to use for cooking all through the year.

The metate seems to have originated in the land where corn was first developed—the home of the Mayas, whose marvelous sculptures and ruined temples are quite comparable with those of ancient Egypt. One therefore would expect to find elaborately carved metates in Central America; and such indeed is the case, for archeological research has resulted in unearthing many ancient metates that are beautifully carved (Fig. 14). In Mexico and Central America legs are a characteristic feature of the mill-

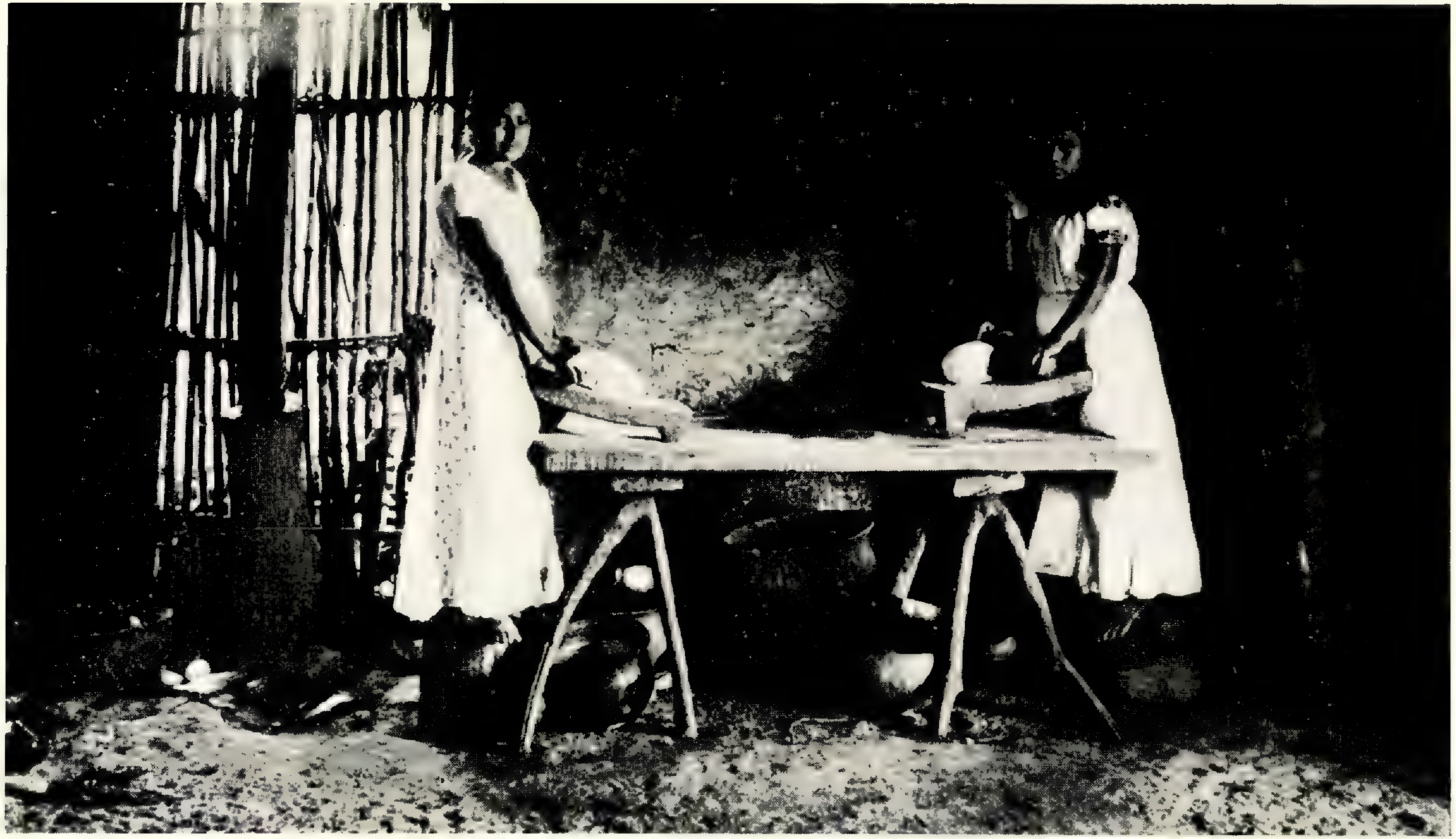

Fig. 13. Putun women of Palenque, Chiapas, Mexico, preparing corn on metates for making tortillas. Photo by Prof. Marshall H. Saville, 1897.

ing stones, as the illustration shows, suggesting that portability was a requirement, whereas in the northern area of their distribution the metates are legless, because they were almost always set permanently in place.

In the United States beyond the Pueblo area the true metate is not found; but throughout that region from the earliest Pueblo culture which had its rise in the introduction of corn, metates and manos are found in large numbers in the ruins of dwellings and sometimes in the open; and they vary little in form from those in daily use at the present time.

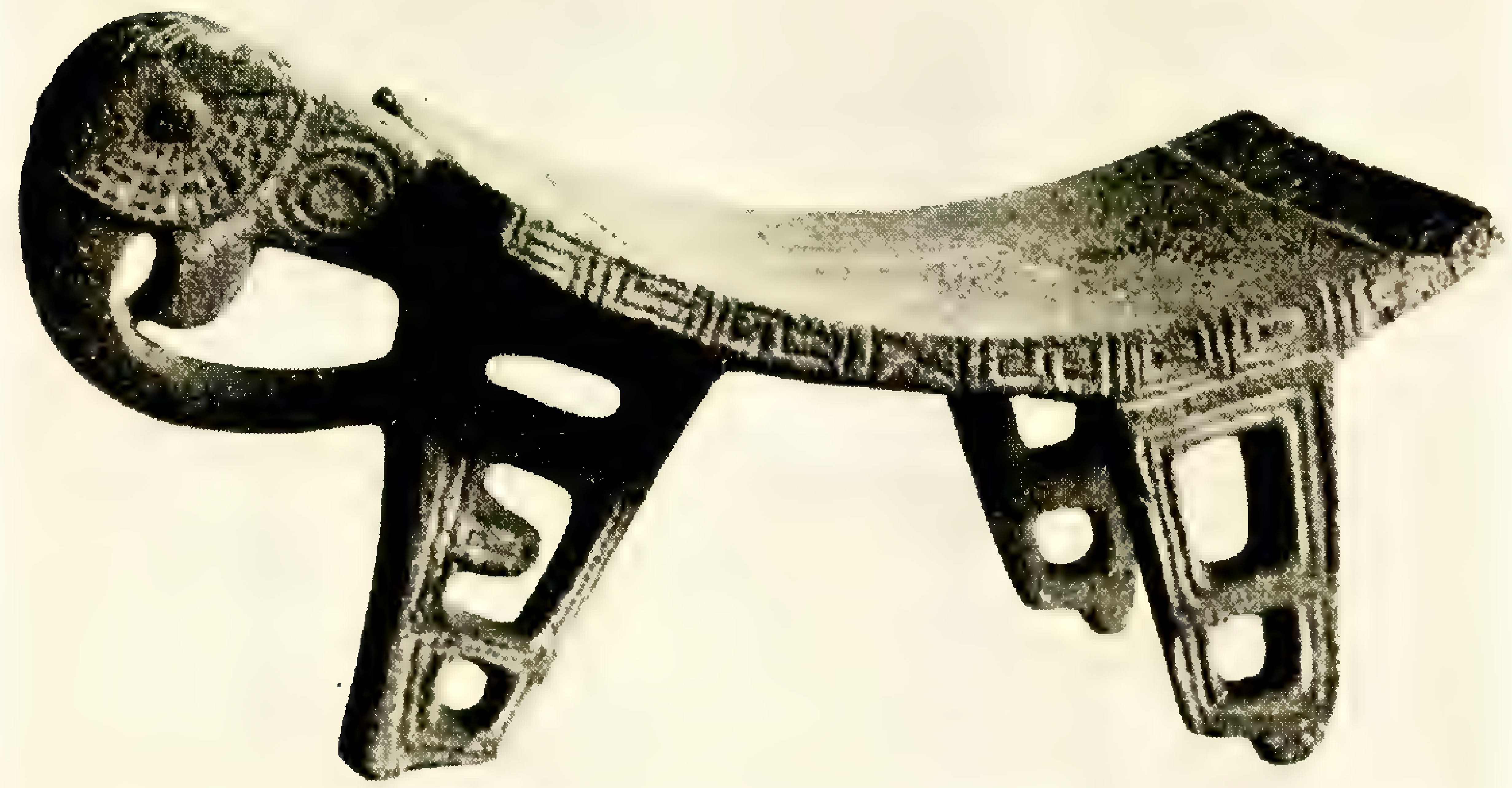

FIG. 14. After C. V. Hartman. Ancient metate from Costa Rica. The carving represents a bird.

The metate and mano in the Botanic Garden were found several years ago in Arizona on the site now submerged by the great Roosevelt reservoir on Salt river. Ruins of the houses and of entire settlements of ancient corn-farmers are scattered over this whole region.

### Mortars Used in the East

In the eastern part of our country the common implement for shelling corn was a wooden peg or the jawbone of a deer with the teeth in place, but in other parts the work was done quite efficiently with a corncob. Sometimes an upright wooden mortar made from part of a tree trunk and having a heavy rod bottom was used with a wooden pestle, the grains falling through the rods to the ground, while the cobs were held. Then the corn was crushed with a wooden or stone pestle in a similar mortar with a solid base, instead of with a metate and mano, the end of the pestle sometimes being fastened with a thong to a resilient tree branch to facilitate pounding. It was by this means that the hominy of the Eastern Indians was made. Corn was stored in various ways—in a pit beneath the floor, in a cubby-hole in a cave, or in corn-cribs such as those common in our Southern States, the form of which was borrowed directly from the Indians. As we have already seen, the Pueblo Indians store their corn in a regular store-room, which sometimes does service also for hiding away various family oddments (Fig. 3).

We should like to say something of the many ways in which corn is prepared for food, but this would take us too far afield—away from the main topic of this little Guide, which is designed to present an idea of the important part that corn and the metate have played in Indian history and industry.

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NOTE: In June, 1928, Miss Alice A. Driggs offered to present to the Brooklyn Botanic Garden a bird bath in memory of her mother. During that summer, while the director of the Garden was collecting on the Arizona desert, near Roosevelt Lake, his attention was called to a large prehistoric Pueblo metate, or flour mill, about 30 inches long by 22 inches wide and 15 inches high. At once it occurred to him that this would make a unique bird bath, of special interest for a botanic garden. The metate, together with the grinding stone, or mano, were purchased and shipped to Brooklyn. In May, 1929, the metate, with the mano securely fastened to it, was installed at the northern end of the Rose Garden, on a mounting designed by Harold A. Caparn, consulting landscape architect of the Garden. The mounting bears the following inscription:

THIS ANCIENT PUEBLO METATE FROM ARIZONA WAS PRESENTED FOR A BIRD BATH TO BROOKLYN BOTANIC GARDEN BY ALICE A. DRIGGS, 1929.

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## GENERAL INFORMATION

MEMBERSHIP.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, Brooklyn, N. Y.* Telephone, 6173 Prospect.

THE BOTANIC GARDEN is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays open at 10 a.m.

ENTRANCES.—On Flatbush Avenue, near Empire Boulevard (Malbone Street), and near Mt. Prospect Reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Montgomery Street.

TO ASSIST MEMBERS and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden*; to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one week in advance. No parties of less than six adults will be conducted.

TO REACH THE GARDEN take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, and Tompkins Avenue trolleys to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street and Vanderbilt Avenue trolleys to Prospect Park Plaza and Union Street.

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* Deceased, September 21, 1929.

# PUBLICATIONS
## OF THE
# BROOKLYN BOTANIC GARDEN

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly beginning with 1929. Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, announcements of courses of instruction, seed list, guides, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others $1.50 a year, 25 cents a number. Circulates in 41 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Circulates in 47 countries.

Volume I. *Dedication Papers:* comprising 33 scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. 521 pages. Price $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. Price $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor, June 10, 1927. 151 pages. Price $1.60.

CONTRIBUTIONS. Established, April 1, 1911. Papers originally published in periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume. Circulates in 34 countries.

*53. Mutation, adaptation to temperature differences, and geographical distribution in plants.* 12 pages. 1928.

*54. The vegetation of the Allegany State Park.* 121 pages. 1928.

*55. Physiologic races of bunt of wheat.* 14 pages. 1928.

*56. The inheritance of resistance of oat hybrids to loose and covered smut.* 48 pages. 1928.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the *Record;* see above.

*Gardens within a Garden: A general guide to the grounds.* Views and folded map. Published, May, 1929. (Brooklyn Bot. Gard. Record, $18^{3}$: 153–188.) Price, 25 cents.

SEED LIST. (*Delectus Seminum*) Established, December, 1914. Since 1925 issued each year in the January number of the Record. Circulation includes 143 botanic gardens and institutions located in 42 countries.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in coöperation with the Botanical Society of America, monthly, except during August and September. Subscription, $7.00 a year. Circulates in 48 countries.

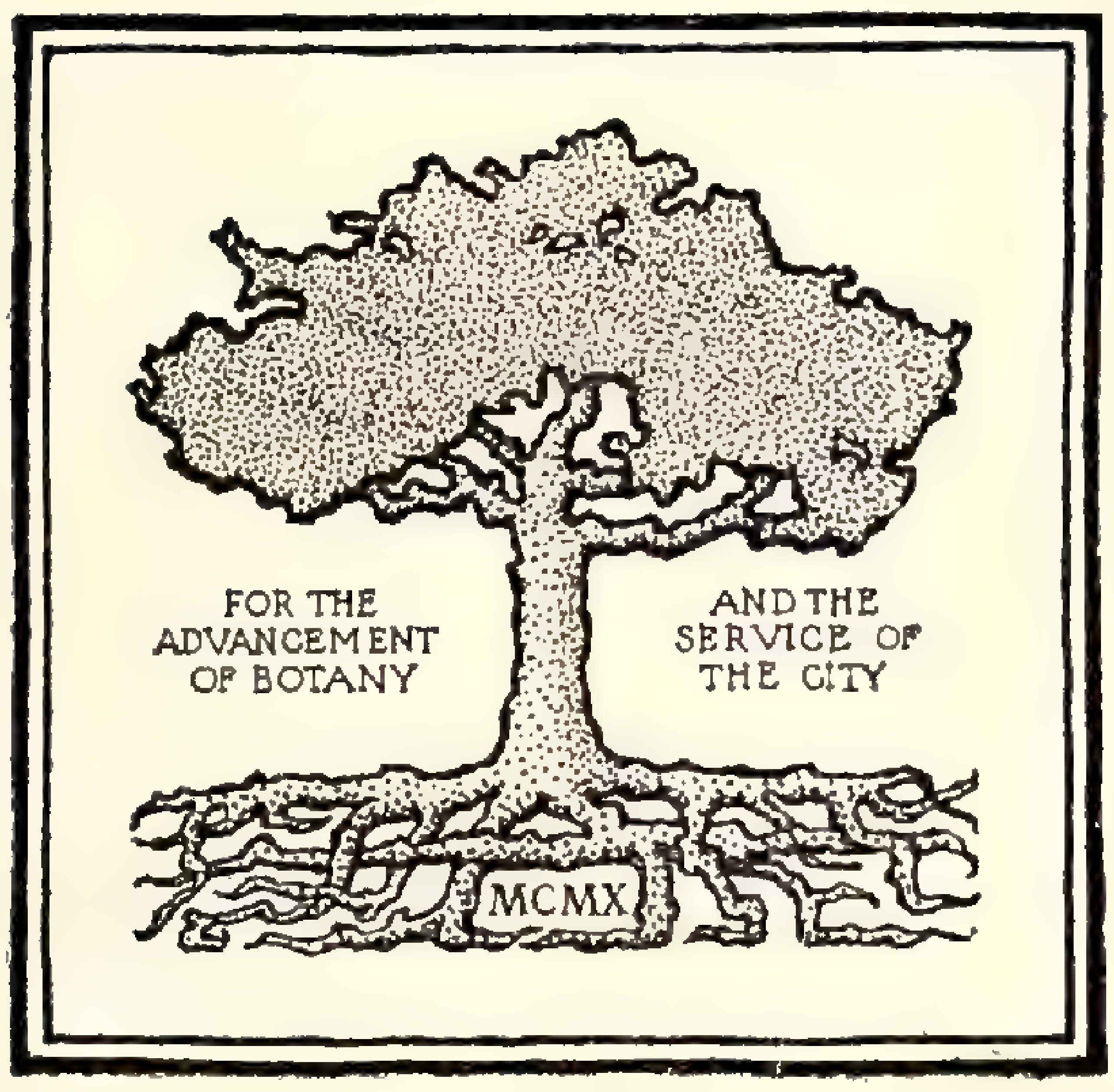
ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the Ecological Society of America. Subscription, $4.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly. Subscription, $6.00 a year. Circulates in 37 countries.

NOV 29 1929

# BROOKLYN BOTANIC GARDEN RECORD

EDITED BY
C. STUART GAGER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AND THE SERVICE OF THE CITY
MCMX

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